JPRS-UCC-86-001

7 January 1986

USSR Report

CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS-UCC-86-001

7 January 1986

USSR REPORT

CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY

CONTENTS

EDUCATION

PUBLICATIONS

GENERAL

COMPUTERS AND MANAGEMENT DECISIONS

Moscow IZVESTIYA in Russian 2 Sep 85 p 3

[Interview by Ye. Manucharova of Academician Nikita Nikolayevich Moiseyev, deputy director of Computer Center, USSR Academy of Sciences: "The Problem Is How to Make a Decision"]

[Text] The basis of management is decision-making. Four conditions are necessary for success. One must know: with what is one concerned (analysis of the object), what must be achieved (the goal), by what is one guided (criteria) and what is the success (limitations). The solution itself is selected according to this. In other words, it is capable of acting on an object.

Our era has introduced considerable complications in the work of man, of whom science clearly denotes management--the person making the decision. He now operates under conditions when there is an acute shortage of time and the information is greater than can be contained in the human mind. It has hence become necessary to automate data processing. The computer is also indispensable for checking an almost unlimited number of alternatives when selecting the most promising version of a decision. It is more and more difficult to rely on "common sense."

To understand how a decision is formulated today, I travel to the Computer Center, USSR Academy of Sciences, to deputy director Academician Nikita Nikolayevich Moiseyev.

[Question] Nikita Nikolayevich! Many people now have the obligation of making the most important independent decisions. How can you help them? And what must one know, who your science calls triumphantly the "person making the decision."

[Answer] First of all forget that working time is limited. He who wants to confine himself to an 8-hour day should select a different occupation. This is why the manager is so specifically named the "person making the decision" and much depends on him. He took on himself the responsibility which cannot be squeezed into the narrow framework of "service." Computerization provided simplification, systematization and the capability of eliminating ambiguity. But it did not eliminate responsibility for the decision.

Managers frequently talk about the need for risk and require independence. This is the right of the manager. And his duty is to investigate his object. To know everything about it. And even something else. The computer helps him in this. But if there is no desire to know reality it is best not to waste money on computers. The use of a computer is an expensive useless exercise "for nothing" without complete detailed knowledge about a situation. Knowledge should be precise. One can then construct models with which the computer can work. By using the computer, alternative decisions are checked at a very rapid rate. Thus, one ascertains without risk which path leads to the target. But people select it.

[Question] And how does the computer help in this? Vital problems arise, but the manager may also not recognize them. Do the numerous regional and sector centers now being created provide this feedback and the exacting signals which do not permit one to ignore the environment?

[Answer] The computer permits one to determine both the range of capabilities and the range of problems. However, the most powerful computer centers are unable to assist managers if their information is not intelligently processed. Information must be formulated in a form in which the manager can work more easily with it. Man should achieve an integrated concept about an object and should be involved in separate details on this background. Clarity of the important thing in information is necessary. Military staffs compile operational charts and changes in the situation are entered on them each morning. One glance by the commander is sufficient to understand the situation. And this is the first step to decision-making. The managers of large national economic complexes must obtain something similar from computers. The computer centers of Selkhozupravleniye [not further identified], Selkhoztekhnika [Association for Sales of Agricultural Equipment, Spare Parts, Mineral Fertilizers and Other Material Means, Organization of Repair and Use of Machines on Kolkhozes and Sovkhozes] and so on operate in each oblast city. They fill in many meters (and even kilometers) of paper rolls with an enormous number of figures. No one is able to look at them; therefore, the figure entries do not help in improving the quality of decisions.

The computer centers initially were supposed to develop information support for an already existing ordinary system of decision-making procedures. This is some deviation from scientific principles--a time maneuver. The truly new technology of working with information also requires new decision-making procedures and, accordingly, new organization of the management structure. But introduction of new technology in any field of human activity is related to overcoming psychological barriers. Adaptation to new systems is possible only after the computer product becomes acutely necessary and convenient in work.

[Question] This will be understandable in an example from life. Perhaps you could talk about this work. Whether it exists.

[Answer] Of course it exists. For example, in Stavropolskiy Kray. There we are assisting the Institute of Cybernetics, VASKhNIL [All-Union Academy of Agricultural Sciences imeni V. I. Lenin] in conducting an experiment. The kray management plans to convert to new forms of work, to simplify information,

to do away with mountains of paper and to make current management more efficient.

We initially worked out a very simple information system for making decisions during the harvest season. This problem is simple from the viewpoint of "important science." All current information comes in daily to the computer center of the kray administration of agriculture. It permits one to compare the real situation to the planned tasks.

But before reaching conclusions about the status of harvest operations, enormous masses of numbers must be crunched. We also first decided to free the managers of this work, using personal computers. Software was developed that permits one to reroute all the information and entire volumes of received figures on a small magnetic disk--a type of long-playing record. The instruction set which permits immediate recall of the necessary information to the display screen is extremely simple. To do this, one must learn a total of four keys. The color screen answers the question in a format convenient to man (in the format desired by him)--a table, diagram or graph. Having looked at the display once, one can immediately understand what new has transpired, how the front of operations has progressed, for whom matters are going well and for whom they are going poorly. All this simplifies very much current decision-making and protects one against errors.

Moreover, the users were given yet another reference system. I arbitrarily call it long-term. It contains slowly changing information about the farms and rayons of the kray--about the quality of soil, equipment and personnel.

Having mastered the new technology of decision-making, the managers of the kray were able to operate their machines without the aid of operators. I saw how the chief of the kray administration of agriculture I. Koblakhov studied the situation, sitting down one on one with the personal computer.

[Question] What can one expect in the future from your work at Stavropol?

[Answer] We would like to develop a system for paperless technology of managing the APK [agro-industrial complex]. Not only for this kray alone, but for a large region generally--for an oblast or for a republic. The information flow upward and downward should dry up. But this does not mean that managers will not have a shortage of information. We feel it is necessary to create unified data banks for the agroindustrial complexes in the regions that are accessible for everyone who makes decisions, for different departments. Every responsible person will be able to obtain any reference by working with four keys of the computer, without resorting to anyone for assistance.

However, total computerization requires greater restructuring of the management structure and overcoming interdepartmental barriers on a unionwide scale. The people of our science should help management in this.

[Question] How is a unified solution being working out for collectives with noncoincident, but not antagonistic interests.

[Answer] We carried out this work in Gomel Rayon of Belorussia. Its initiator was V. A. Gvozdev (at that time first secretary of the Gomel obkom and later chairman of Gosplan of Belorussia). The cooperation of 17 kolkhozes was developed. The union was voluntary and advantageous for all participants, with efficiency exceeding the total efficiency of individual participants. The basis of the alliance was livestock. A large complex was constructed at one of the kolkhozes for feeding beef cattle and the remaining kolkhozes brought their calves and fed them. The idea was clear, but not simple to implement. Prior to cooperation, each farm received a plan from a superior organization--such and such a quantity of wheat, such and such a quantity of oats, such and such a quantity of potatoes and so on. They now received the plan for the entire association and added their own needs to it, related to feeding the beef cattle. It is better for one kolkhoz to grow potatoes and to plant them and another kolkhoz has the skill of cultivating mangels, it is better for a third to grow grain crops and so on. Such a division of labor should provide a discernible benefit. And how is the income divided up?

There are profitable crops--for example, wheat, and there are unprofitable crops--potatoes. A system of intracooperative accounting and unique "internal prices" was necessary. It was even more complicated to establish the prices for which calves for feed were purchased from other kolkhozes.

The decision, worked out by using our calculations, corresponded to all the principles of management science. The goal was clear and the managers had a thorough knowledge of the capabilities of the region and of the technological, demogaphic and other capabilities. It was fulfilled successfully. And the results were very clear. People began to live better and to construct more. People were attracted to the village--a sure sign of prosperity.

But it was extremely difficult to bring such an important decision to life. And not because someone was negligent. The main obstacles were created from outside. Roughly speaking there were no instructions for cooperation. The "internal prices" caused special indignation. Minfin [Ministry of Finance] of the republic was ready to embargo the accounts of the kolkhozes. I can say without exaggeration that the decision to create the Gomel Rayon Agricultural Association would not have been implemented if there had not been the enormous energy of the innovators for cooperation and the absolute support of the republic organization.

[Question] How are decisions made and implemented when there is a conflict situation.

[Answer] Essentially any situation in which several people are acting is conflict in nature. The episode that I just related is also a unique conflict. A collective decision is always a compromise. Each person loses something to something else.

Selection of a compromise is not simple. A collective decision should primarily provide an advantage to everyone. But the advantage is lost if someone violates the agreed-upon pledges. And in this case he is the one who should primarily suffer. There is also the guarantee that each one will

perform his obligations. But this by itself is insufficient. It is also necessary that the decision be effective. In other words, that the situation be improved immediately for everyone simultaneously.

It is complicated to achieve all this. The theory of collective decisions is still deficient in scientific results. We should also seek common approaches and learn how to formulate common principles. A mechanism which could be called "the institute of agreement," is required.

The decision in Gomel Rayon was implemented very well because each understood its advantage.

[Question] To what extent can the accuracy of a decision affect its effectiveness. Or are will and monitoring still necessary.

[Answer] They are necessary. First, the executive does not immediately catch the essence of the decision (which occurs frequently). It may distort his own interests. To complete the matter, one must use authority. Very intelligent and very talented decisions sometimes remain noble desires if the required persistence is lacking. However, will alone is not sufficient to implement a decision. It is very important that it correspond to the interests of the executors. Let us say that wages are directly related to achieving the final result, that the prosperity of workers depends on the size of the profit and so on.

But I would like to return you to accurate selection of goals. One can make a decision, convenient for subordinates, and one can implement it. Does this mean that there is effectiveness? However, it may also be anti-State. Imagine a large nonspecialized sovkhoz. It grows grain and millet, beets and potatoes, breeds cattle and so on. The plan is "lowered" for it: to turn over so much wheat, to turn over so much groats and so on. The director tries to see that the plan is fulfilled "net" under any conditions. The remainder is more or less dismissed. Grain is most advantageous of all, he supports this, while he disregards the other crops. As a result the land will be used inefficiently. And it will be difficult as before to purchase buckwheat.

If the kray managers were able to follow all data for all farms (as in Stavrapol), they would have to see on the displays of the personal computers both the degree of fulfillment of the plan and the nature of utilization of natural resources. And having seen, the necessary corrections would have to be entered into the director's activity.

[Question] Why do you say "follow" rather than "check."

[Answer] Periodic checks are insufficient. The execution of a national economic decision can be drawn out. Both for months and years. It should not lose its timeliness during this time. Its effectiveness is provided by analyzing the received information and by new additional decisions which take into account and correct different inaccuracies with respect to changing events. Modern informatics provides this possibility--it "follows" the paths of execution. Therefore, responsible people are capable of conducting the necessary analysis of interference and of entering the necessary corrections.

They can improve the decision itself and can intensify the activity of people who implement the decision. The reliability of all these actions is achieved by computer processing of information. Realistic use of computers brings order and control into everything. I feel that man, who does not wish to subject his activities to a computer check, does not understand the entire measure of responsibility which he has taken on himself, becoming the "Person Who Makes the Decision."

6521

CSO: 1863/463

"ELEKTRONMASH" INCREASES COMPUTER OUTPUT AND QUALITY

Moscow IZVESTIYA in Russian 22 Sep 85 p 1

[Article by N. Baklanov, correspondent]

[Text] Workers of the Kiev production association "Elektronmash" (elecrronic machines) have completed the 5-year plan ahead of time. The output volume at the enterprise has increased 90 percent as a result of an increase in labor productivity.

The association's product--computers based on large integrated circuits with a very wide range of uses--requires especially high reliability and quality. This, in turn, is possible only at a high level of automation of production processes. For example, a new galvanizing section in the printed-circuit board shop at the association has made it possible to free 26 workers from low-productivity manual labor, with an accompanying increase in product quality.

"In the very near future, we will be faced with even more difficult tasks," said Hero of Socialist Labor A. Nezabitovskiy, the association's director-general. "As technological progress goes ahead, we will have to turn out products of the highest quality category.

"At the same time, the volume of computer production will also increase--during the next 5-year plan it will double. This is one of the most important aspects of our socialist obligations, to which the 'Elektronmash' workers are committed for the 12th 5-Year Plan."

FTD/SNAP
CSO: 1863/20

MANY PROBLEMS OF COMPUTERIZATION REMAIN UNSOLVED

Moscow PRAVDA in Russian 28 Aug 85 p 1

[Abstract] The editorial calls attention to problems that must be solved to ensure the success of the nation-wide program for the development, production and efficient use of computer technology and automated systems, which was endorsed by the Politburo of the Communist Party Central Committee. It observes that despite the fact that some good practical experience has been amassed in developing and introducing computers in certain spheres of production and management, there remain many unresolved questions which are said to be due largely to lack of coordination among agencies.

The editorial says there is a serious problem with standardization of computer hardware and software. The electronics industry, the radio industry, and the instrumentation industry are producing computers and peripheral equipment of various classes and series which are said to be far from compatible. This lowers the efficiency of machine use and poses obstacles to the creation of unified industry and regional computer systems. Too many algorithmic languages are used in compiling computer programs. Also, there is said to be much duplication of efforts, and there is no effective system for identifying and publicizing the best programs. It is said that there is a serious need for improving the system of servicing computer technology. The service association "SoyuzEVMkompleks" and similar organizations reportedly do not extend services to many computers that are in operation, and the level of their services is said to be less that adequate.

The editorial also addresses problems of inefficient use of computers, including use of computers for simple accounting and calculating tasks, and of training specialists to work with computers.

FTD/SNAP
CSO: 1863/20

HARDWARE

UDC 681.323.658.511.9

EFFICIENCY ANALYSIS OF COMPUTER SYSTEMS WITH SPECIAL-PURPOSE COMPUTERS

Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 8, Aug 1985
(manuscript received 1 Mar 84) pp 144-149

ZABOLOTNYY, A. A., and LARGIN, V. A., Severodonetsk

[Abstract] The paper investigates functioning of a high-throughput computing system with specialized data processing units. It is analytically and experimentally shown that organization of the common computing resources of multiprocessor systems, dynamically redistributed between the commands of signal programs, is advisable during use, not only of single-type but also of specialized different-type computers. A significant increase of the system's efficiency (on the average by 20%) is attained in this case, at the cost of a comparatively negligible (on the average by 2%) increase of the amount of the equipment of a general computer resource. Examples of the PS-3000 are given. Figures 1; tables 1; references: 5 Russian.
[7-6415]

UDC 681.324.012

ANALYSIS OF PRODUCTIVITY OF SPECIALIZED MICROPROCESSOR SYSTEMS WITH COMMON MEMORY

Kiev ELEKTRONNOYE MODELIROVANIYE in Russian No 1, Jan-Feb 85
(manuscript received after revision 31 Oct 83) pp 99-101

SMOLYAROV, N. A. and TARASOV, V. A.

[Abstract] A feature of specialized microprocessor systems is the possiblity of conflict situations occurring when common resources (common memory sections and busses) must be distributed among processors and the problem is considered of evaluating time losses due to solution of conflicts for access to storage facilities. The system as formulated consists of several microprocessors and memory sections. Each processor has its own small storage capacity for certain programs and data while the

common storage contains all data and programs for all other tasks. All processors are linked to all storage sections. A method is presented for solving the queuing problem and a flow cahrt is given. On the basis of the algorithm, a modelling program in FORTRAN-IV was established and the results of the modelling confirmed the theoretical formulation. Results of computations on a YeS-1022 computer showed that for an undivided common store and ten or more microprocessors losses of time can be considerable and it may be necessary to increase the number of sections. The method for analytic and statistical modelling of evaluation of waiting time because of conflict situations for processor access to memory can be used for productivity analysis and also for the synthesis of microcomputer systems as concerns time criteria. Best results can be expected for systems in which the memories are constructed in such a way that each processor has an equal probability of access to all parts of the common storage.
[339-12497]

SOFTWARE

UDC 681.3

THE "KOMPAS" DATABASE MANAGEMENT SYSTEM HIGHER-LEVEL QUERY LANGUAGE

Dushanbe DOKLADY AKADEMII NAUK TADZHIKSKOY SSR in Russian No 4, Apr 85, pp 205-207

[Article by B. G. Pallayev, Mathematics Institute at the Computer Center, Tadzhik SSR Academy of Sciences]

[Text] This article presents the higher-level language for manipulating sets of records in a network data model and its implementation in the "Kompas" system.[1]

This language was developed for a relational-network data model, which can be used for the effective implementation of various conceptual representations. In the "Kompas" system, the relational-network data model is based on a simplified CODASYL network data model.[1,2] A lower-level language is used for data manipulation in the "Kompas" DBMS: a network lower-level language derived from the data manipulation language (DML) proposed by CODASYL with the appropriate modifications.[2]

This higher-level DML may be used not only by end-users, but also to upgrade the language used to implement the "Kompas" system itself.

Description of the Language

Network higher-level query language refers to the first version of the relational-network higher-level language[3] implemented for the data model supported by the "Kompas" DBMS on the BESM-6 computer. Limitations of the network higher-level language, compared to the relational-network higher-level language, include the following: it lacks set-theoretic operations; complex functions for data reporting are not implemented; report listings of the desired data elements must be directly specified for those sets that own the data.

The basic syntactical construction of the network higher-level language is the data selection formula, consisting of a sequence of set names and selection conditions separated by a period. The data selection formula defines a set consisting of the nodes of its corresponding balanced record

tree selected from the data base; each branching point in the data selection formula defines a continuation of the previous tree through its branches with records tied to the nodes of the subsequently specified set type. The selection conditions for the records-nodes of the preceding tree may be specified at any point in the data selection formula. These conditions are specified in brackets and are checked for each record-node. If the condition is not met, the node with the preceding branch of the tree is removed up to the nearest branching. In the present version of the language the comparison operators =, ≠, >, ≥, <, ≤ and the Boolean operators AND, OR, and NOT are permissable operators in expressions of condition. Operands in comparison operations may be numeric and string constants, as well as elements of record paths to the node to which the selection condition is applied, as defined by the data selection formula. It is permissable to specify as a selection condition a range of existing values for data elements. The Boolean operator AND may be replaced with a comma.

The selection formula is said to be complete when it starts with a singular set. Complete formulas with a specified data listing are called network higher-level queries. Those record elements of the selected set that are essential for obtaining the desired result are enumerated in the list of data. If there are elements with identical names, they may be more exactly specified with the name of the corresponding record.

A simplified syntax of the network higher-level language notation[1] is presented below:

```
FIND|[IN REGION temporary-region-name] selection-formula

OUTPUT [{network-higher-level-query}]
       [{data-list                  }]

CHANGE [{network-higher-level-query}]
       [{data-list                  }]

EXCLUDE [selection-formula]

REMOVE [selection-formula]

network-higher-level-query ::= output-term [=output-term]...
selection-formula ::= selection-term | [=selection-term]...
output-term ::= selection-term [data list]
selection-term ::= set-name|[selection-condition]
selection-condition ::= [logical-expression]
data-list ::= ({record-name[=element-name]},...) element-name
```

Network higher-level language syntax reflects two ways of manipulating record sets in the network model. With the first approach, the set of selected records being processed (for reporting, modification, elimination, or removal) must be first saved to a temporary data base. With the second approach, record selection and processing are combined and

take place without temporarily saving the record set, which corresponds to the presence in the operator syntax of data selection constructs.

The network higher-level operator FIND stores the temporary data base with the selected records, and also can define the appropriate region for the temporary data base. All subsequently used language operators work in this region until a new one is established. The entire record set does not get stored in the temporary data base, just the terminal record-nodes of the selection tree, i.e., the record set of a single type.

In order to support users working interactively, the semantics of the OUTPUT operator is slightly changed by more extended reporting facilities. The operator argument is the set of all (and not only terminal) records as specified in the network higher-level query, where report listings of the desired data elements are also defined. The second approach is used in implementing this operator.

The semantics of the operators CHANGE, EXCLUDE and REMOVE are the same as the corresponding operators of the network lower-level language, except that the range of the network higher-level operators is the whole set of selected records.

Examples illustrating network higher-level language constructs are presented for the data base "parts-suppliers".[3]

Example 1. Output the supplier numbers located in Dushanbe and having a status of greater than 20:

```
OUTPUT SUPPLIERS [STATUS>20, CITY = "DUSHANBE"] (NP).
```

Example 2. Change the color of part D2 to yellow:

```
CHANGE PARTS [ND = "D2"] (COLOR = "YELLOW")
```

Example 3. Remove supplier P3:

```
FIND SUPPLIER [NP = "P3"].  PRESENT REMOVE

REMOVE SUPPLIER [NP = "P3"].
```

First, all supplies of the given supplier are removed, followed by information about the supplier.

Network Higher-Level Language Implementation

The network higher-level translator consists of two parts: the compiler module and the interpreter system.

The task of the compiler module consists of generating programs in the network higher-level translator's object language for each network higher-level query. The "Kompas" DBMS network lower-level language, augmented with

operators for object program looping and control, is used as the object language. For example, the conditional branching operator is introduced to control the program, depending on the value of the data base exception condition indicator set by the DBMS resident as a result of executing the network lower-level operator.[1]

The compiler produces a compact representation of the network higher-level query (network higher-level table), as well as some other auxiliary tables that are necessary at the query interpreting stage. In addition, the compiler module performs a lexical and syntactical check of the input language, and, if it finds an error, issues the appropriate messages, and the compiler finishes execution.

Input language analysis and checking is impossible without knowing the special features of the subschemas from which the queries are generated. The "Kompas" system dictionary-directory is actively used for this purpose.[1]

Interpreting the network higher-level tabel amounts to the interpretation of two kinds of entities: network lower-level language operators and operators used to generate the object program. The DBMS resident is invoked to execute network lower-level operators, and the appropriate interpretor modules (form computing logical expressions, error analysis and reporting, end of operations, and others) are invoked to execute the other operators.

The network higher-level translator is written in embedded Pascal[1] and uses the lower-level language. This translator may be used in two modes: batch and interactive, through the "Kompas"-BESM system off-line access module.[1] The network higher-level language translator is completely machine-independent and will be installed in the "Kompas" DBMS version for the YeS and SM series computers.

BIBLIOGRAPHY

1. Filipov, V. I., "Rukovodstvo po SUBD 'Kompas' [\"Guide to the 'Kompas' DBMS"[, Computer Center of the USSR Academy of Sciences, 1981

2. "Predlozheniya KODASIL po upravleniyu bazami dannykh" [\"CODASYL Proposals for Data Base Management"], FINANSY I STATISTIKA, 1981.

3. Filipov, V. I., "The Relational-Network Data Model," in "Prikladnaya informatika", FINANSY I STATISTIKA, No 2, 1983.

12713/9835
CSO: 1863/453

UDC 519.685

MODELLING BY DYNAMIC PARALLEL INTERACTING PROCESSES

Kiev KIBERNETIKA in Russian No 4, Jul-Aug 85
(manuscript received 10 Jan 83) pp 13-15

BOREYSHA, YURIY YEVGEN'YEVICH, candidate of physico-mathematical sciences, senior engineer, Kiev State University

[Abstract] The paper considers key aspects of the development, investigation, and realization of a model of parallel computations, called "Dynamic Parallel Interacting Processes" (DPVP). With the creation of DPVP a number of models of parallel computations and the languages associated with them are analyzed and used. These models are based on published papers, including three of which Boreysha is a coauthor, and of one the author. In designing DPVP, the works of Dejkstra, Hoare, Hanson, Vilenden, Glushkov, and Anisimov were examined, as well as aspects of Ada and the RC 4000 Computer of Hanson. A system of modeling interacting processes was created using DPVP, and has been realized under OS YeS in PL/I. References 8: 6 Russian, 2 non-Russian.
[8-6415]

UDC 681.3.06

PROBLEMS OF LOGIC PROGRAMMING LANGUAGE DEVELOPMENT AND LANGUAGE IMPLEMENTATION ON MICROCOMPUTERS (USING EXAMPLE OF YARUS-2 LANGUAGE)

Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 6, Jun 85
(manuscript received 21 Feb 84) pp 149-159

VOKLER, I. E., GRIGORYAN, A. K., KUZNETSOV, O. P., MARKOVSKIY, A. V. and SHIPILINA, L. B., Moscow

[Abstract] Universal algorithmic languages are not efficient in microcomputer applications; this necessitates the development of specialized programming languages. The most promising of the latter in terms of the language support for logic programming is the automata approach proposed

by O. P. Kuznetsov and based on the use of finite automata languages. This combines the convenience of a high level language, problem orientation towards logic control and the capabilities of optimization and semantic control offered by automata theory. This paper describes the YaRUS-2 language, based on a so-called system of interacting automata graphs: this is a model functionally equivalent to the classical model of an abstract finite automat. YaRUS-2 is but one of a large class of such languages. The discussion of the specific features of computer-aided programming of automata type languages covers the programming language itself, the means of inputting and editing the texts in the source language, the input and output of the data (the values of the input and output variables), the translator and the debugging aids. The YaRUS-2 software has been placed in series production for service with numerical program controlled machine tools and is implemented with two "Elektronika NTs-80" microcomputers. One of the microcomputers serves as the programmer, i.e. inputs and edits the texts in the YaRUS-2 language from a video termianl and executes the syntactic analysis of the translation into the microcomputer codes. The main memory requirement of the YaRUS-2 software is about 4 Kwords. The original and translated texts of the programs are stored in a nonvolatile bubble memory and can be transferred to other media. During execution, the programs are transmitted by teletype link to the executing microcomputer of the numerical program control system. An appendix details the YaRUS-2 syntax. References: 11 Russian.
[398-8225]

APPLICATIONS

UDC 025.4.036:02

PROBLEMS OF THE DEVELOPMENT OF THE INFORMATION BASE FOR ASPR OF UNION REPUBLIC GOSPLAN: A DISCUSSION

Moscow KLASSIFIKATORY I DOKUMENTY in Russian No 8, Aug 85 pp 1-6

[Article by A. V. Kovalev, candidate of economics sciences, A. V. Lobanov and T. A. Utkina (NIIASPU Gosplan BSSR)]

[Text] The creation of an automated system of planning calculations (ASPR) as a complex man-machine system is dependent on the need to build up an information fund (IF) on the basis of automated data banks, which contain not only economic planning indexes but which also perform an active functional role in providing algorithmic and language support. The problems of building up functional loadings into fund become especially pressing in regard to "dialogization" and to the implementation of "modular" technology, which replaces a task-by-task system structure and provides its flexibility and broad user capabilities [1].

In this regard the IF must be developed as the heart of the SPR, which is a technological complex that includes data base systems, means for interaction and management, high-level user language, and also an expandible set of standard functional modules.

The development of such a complex will allow one to modify the role and principles of setting up functional problems. Above all, independent functional system facilities will not have to be set up for carrying out each particular type of planning computation. High-level language with the supporting software of the system developed provides the user with the possibility of carrying out such computations by inputting the problem using a video terminal. If application programs are needed, such as when the solution of functional problems involves sufficiently complex calculations based on the use of mathematical economic models, the development of such programs must, essentially, be included in the preparation of the statement blocks linking the standard procedures and modules.

The foundation of the IF is the data base (DB) system, which is interconnected organization of information with the purpose of providing integrated processing of the information and output in the form required by the user. The make-up of DB systems is determined by a combination of informational, mathematical, and technological factors. The technological factors include the volume and structure of the data, make-up and characteristics of the data-base management systems (DBMS), the operating

technology of the ASPR, and the computer network. At this point one must separate the central DB from the data base system. Its components must be large files of general-system information, and in particular a data-base vocabulary which provides interactions with information entering the DB systems and also communication with the Republic's automated management systems (RASU).

The organization of the integrated information storage based on data bases assumes the presence of internal (intrabase) and external (user) levels of data representation and the links between them being maintained by the DBMS [2]. The internal level of data description is set up on the principle of achieving information storage efficiency. It is determined by the predominating structure of the data and their organization in the DBMS. The description of data at this level, which is intended for use in a range of applications, usually differs from the external level descriptions of specific user information.

The DBMS SPEKTR is used in the BSSR Gosplan ASPR, and the internal levels of data description are provided with large files of information in document representation, in the form of structured indexes, and also as a fill of general-system vocabularies.

Together with the indicated two levels, one must identify an intermediate conceptual level of data description which assures the transformation of the intrabase information storage structure into its user representation structure. The availability of the conceptual level in data bases contributes to their independence and to interaction flexibility with respect to the users.

In the BSSR Gosplan ASPR the meta-information of the conceptual level of description fulfills three main functions: input and storage of data; access to stored information; and self-management of the data bases.

A promising direction of data-description conceptual-level development is the establishment and accumulation of meta-information for the purpose of ensuring the reliability of the stored data during storage. Of significant importance is the acquisition of quantitative correlations between indexes in the form of various kinds of economic ratios.

A subsequent direction is that of the problem of the organization of metadata which reflect structural correlations or qualitative index relationships.

With appropriate development of software such information will improve further the relationships between internal and external levels of data representations.

Achievement of the proposed directions of development of metadata will definitely decrease the volume of stored information by virtue of the elimination of derived data.

Of vital importance is the development of meta-information for automating the procedures for data-base self-management, such as the protection, integrity, and "clean-up" of the stored information.

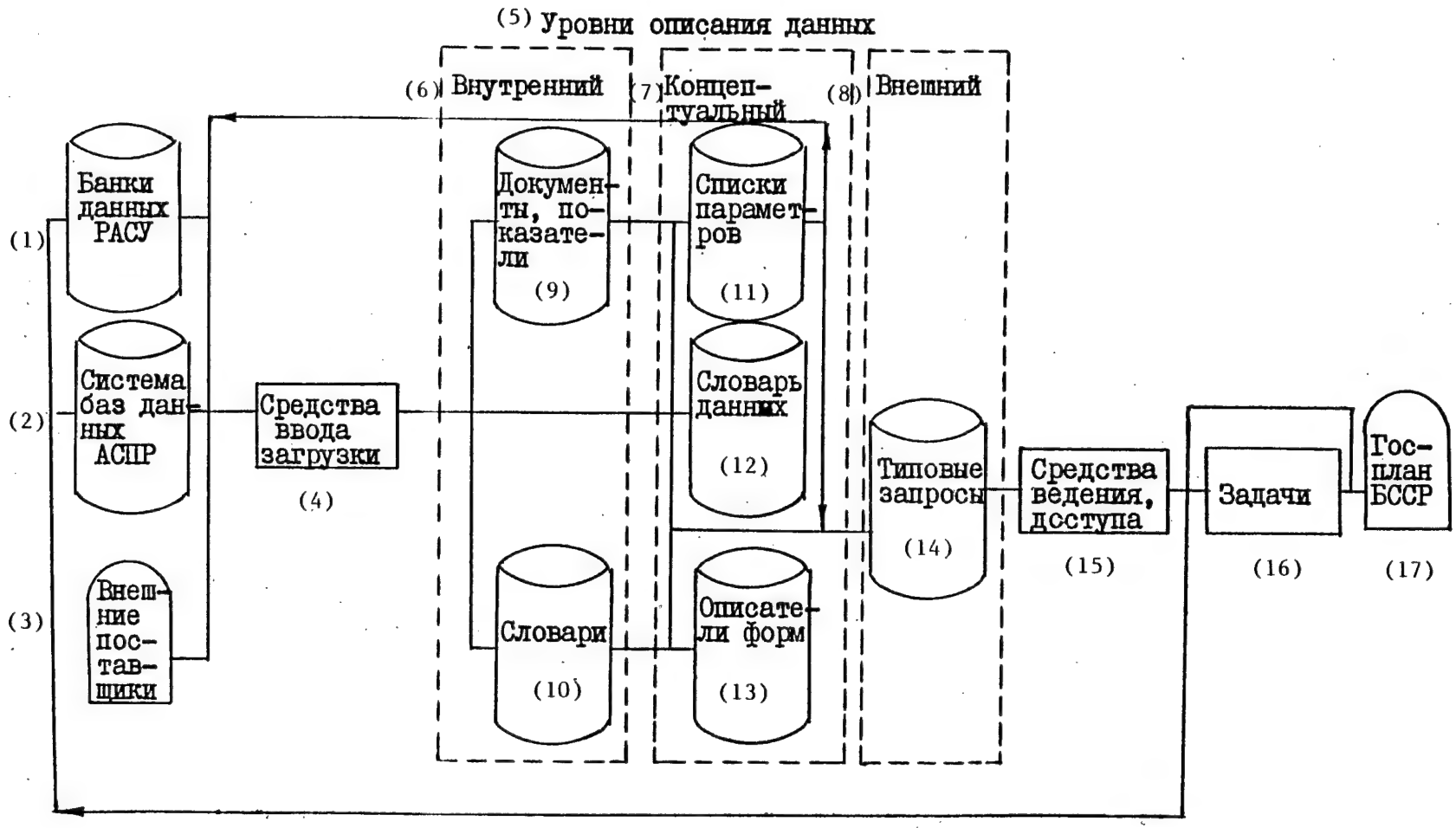
The external level of data representation is traditionally specified in application programs or in the dialogic inquires of the end user. However, experience in designing the BSSR Gosplan ASPR IF indicates the advisability of organizing external descriptions of data directly into the DB. Such an approach contributes to the stability of the application software with respect to changes in user needs. These changes may be due to the transformations of the forms of the documents and, what is more dangerous, to processing algorithm modifications. In the more established design of ASU such changes lead to the need for modifying or even reprogramming functional tasks. The presence of external levels of data representations in the DB in combination with standard modules and user language makes it possible to solve these problems to a significant extent.

In the ASPR IF version developed by the BSSR Gosplan, the external levels of data re handed by the presence of standard user inquiries, given at the present time in tabular forms of describing data selection criteria [3]. Improvement of the structures and compositions of standard inquiries is expected later on by providing greater flexibility in reflecting user needs and also by setting up standard requirements for numerical and textual information. In particular, it is necessary to create in the DB document-form descriptors with links to large vocabularies to increase the role of general-system vocabularies and to decrease local textual information.

The basic function diagram of the ASPR IF is shown in the figure. At the DB-loading state, data containing descriptions and interrelationships of the information to be stored are input and stored in the vocabulary. The data vocabulary, serving as a data-base thesaurus, is used both for control functions during creation of the information collection and also for organizing the management of the base and access to the data. At the present time the meta-vocabulary of attribute identifiers in the BSSR Gosplan ASPR serves to some extent as a data vocabulary [3].

The parameter lists perform formal control functions during input and access. Consequently, their files must be created before loading the main information.

User access to the data base is accomplished at the inquiry level, which either has been previously stored in a standard version, or is entered directly into the application program or into a problem-solving command with input being via the video terminal. Then, the external data representation levels specified in the inquiry are transformed into internal description levels using conceptual level meta-information. For numerical data this is provided by data vocabularies in which the interrelationships of the stored information are reflected and by parameter lists of forms and structural indexes, which specify formal relationships between the data and the physical description levels. Access to the vocabularies is provided by form descriptors, which contain descriptions of the document and video display forms with links to the vocabularies.



Key:

(1) RASU data banks
(2) ASPR data-base system
(3) External suppliers
(4) Loading means
(5) Data description levels
(6) Internal
(7) Conceptual
(8) External
(9) Documents and indexes
(10) Vocabularies
(11) Parameter lists
(12) Data vocabulary
(13) Form descriptors
(14) Standard inquiries
(15) Access and management means
(16) Problems
(17) BSSR Gosplan

The proposed approach to the development of IF assumes the realization of extensive studies in regard to improving the techniques of designing information handling in ASPR. An important direction is the solution of methodological problems of structuring indexes, which must be based on the development of formalized means of describing data.

Methodological developments must be combined with a detailed analysis of the object of the ASPR--the national economy and, above all, with the analysis of the information flows and the structures of planning indexes.

Analysis of these areas establishes a basis for developing IF structures which provide flexibility and fully satisfy the needs of the ASPR with due regard for system expansion. Moreover, such studies are the preparatory stages for meeting the requirements of the means needed for mathematical technological, and technical support of an information collection.

BIBLIOGRAPHY

1. Raysberg, B. and Kuranov, G. "Problems and paths to the use of mathematical economic methods for planning". PLANOVOYE KHOZYAYSTVO, 1983, No 7.

2. Atre, SH. "Strukturnyy podkhod k organizatsii bazdannykh [Structural approach to data-base organization]", Moscow, Finansy i statistika, 1983.

3. Lobanov, A. V., Mikhasenko, G. M., and Ranitskaya, V. Yu. "Composition and structure of BSSR ASPR data bases" VOPROSY RAZRABOTKI I VNEDRENIYA AUTOMATIZIROVANNOY SISTEMY PLANOVYKH RASCHETOV GOSPLANA BSSR [PROBLEMS OF THE DEVELOPMENT AND INTRODUCTION OF THE AUTOMATED SYSTEM OF PLANNING CALCULATIONS OF THE BSSR GOSPLAN], Minsk, 1984 (Sb. Nauch. Tr./NIIASPU BSSR Gosplan)

12863/9835
CSO: 1863/447

DIALOG WITH A MACHINE

Minsk SOVETSKAYA BELORUSSIYA 10 Aug 85 p 4

[Article by Zh. Tkachuk, under the rubric "Scientific and Technical Progress: Problems and Opinions."]

[Text] The practice at the "Brestgrazhdanproyekt" design institute of introducing automated design systems based on the technological line of design is evidence of the realization in a small design organization of the highest stage of production automation. Today, more than 17 design organizations of Gosstroy and other agencies have become followers of the technological line of design developed here which is one of the first in the country in the construction industry. This technological design line twice has been awarded prizes by the Exhibition of the Achievements of the USSR Economy.

But the "Brestgrazhdanproyekt" is taking new steps in the development of this beginning.

They Began from "Zero"

...Initial information, prepared on a magnetic disc, has been entered into a computer. It has formulated a question. The designer has communicated the next information to the machine.

This is the sequence of today's work. Having "demanded" data from the designer on an elementary shift in the plan for foundations relative to the working field of the drawing and to the regulation of the size of the maximum gap between slabs and having analyzed a number of other answers, the machine gradually forms a geometric outline of the object and makes a "tie-in" between the foundation slabs and the axes, specifications, and notes. Convinced that the initial information has been perceived correctly, the designer gives the command for the portrayal of graphic information on a plotter.

"Several years ago, let us say, in 1979, the institute did not have such automation," says the chief automated design system specialist, N. S. Shikasyuk, showing data from the elementary processing of that time. Its essence lay in the automation of all engineering and economic estimate calculations accompanying designing and based on programs then existing in the country. On their base, the designer had to solve the problem of whether it was better to "tie-in" a typical design with the

locality having thus increased the amount of materials used. (Today, this is a function of a machine.) The processing of such information "by hand" took much time, bore a subjective character, and depended on the qualifications of the designer and, sometimes, also, simply on his conscientiousness. Therefore, often a portion of the optimum solution that resulted from the whole computer effort was often lost, and the calculational part of the total work on the design was very small--about 8 percent in all.

Now, it is difficult to say who first had the idea of teaching a machine to think instead of the engineer or, even more, to inculcate the logic of engineering thinking--to process properly the collected information and by itself find the optimal variant for the solution. Moreover, in the process of subsequent introduction at "Brestgrazhdanproyekt," this idea became intertwined with the principles of creating such a system at a high stage of automation that, in one uninterrupted cycle, could produce the calculations, the design, the drawings, and the compilation of specifications, that is, prepare a completed design product--a working drawing with optimum consumption of material.

Still, it was a long way from the idea to its fulfillment. This path was also difficult for the institute director, M. S. Takoyev: "We had to study a mass of information on existing automated systems, principles of computer work, their capabilities in the design field, the prospects, and the maximum possible return from computer technology."

During the search, the doubts were overwhelming also: you see, for the designer's logic to be understandable to the machine, it had, as a minimum, to be translated into special "machine" language, for example, into "FORTRAN IV," to create general and applied software. And for this, there were years of intense work. The realization of the task was complicated, insofar as the design has a complex logical structure and yields only with difficulty to formalization with the aim of translation to the language of machine logic. In addition, there were no specialists at the institute with experience in computer work. This meant that they had to be found and taught in the collective itself. Many questions arose. Would the funds allotted for the acquisition of computer technology give maximum return?

The sober calculation of strengths and reserves and the consciousness of the need and great state importance of the intended enterprise became the strong base that helped solve the problem.

And they began from "zero"--in the direct and figurative sense: insofar as the problem of designing foundations in connection with the peculiarities of the relief in each new locality, the engineering-geological sites, it cannot be based on typical solutions and always requires individual development of the construction unit "below zero." The economy and reliability of the whole structure largely depends on the level of the solution to this problem.

Every Fifth One Is Free

After only a year, there appeared the first hint of success--the computer complex produced a drawing of the optimal apportionment of foundation cushions. Today, the specialist smiles when he remembers that first drawing--there were no axes nor legends. It was still a long way to complete victory, but the fact remained--there was such a thing as optimality! Nevertheless, a year was needed before the three-year labor o the enthusiastic engineers finally put down the first line--a system into which went over fifty programs began to work, began to work in a stable way, and was put into operation with an "excellent" evaluation. For the first time in the country, a technical design line was created for the foundations of buildings and structures.

Continuous automation of design jobs became the new step in design practice--the calculation part, design on the basis of calculated parameters, graphic work, and the determination of technical-economic indices. All this gave an important advantage--the creation of a multivariant designing, which would result in significant savings in materials and would allow, at the same time, a significant increase in the labor productivity of designers.

The result made an impact. Any non-believer could touch it, as they say; a level, very high in the BSSR Gosstroy system of automation of design work, was achieved--17.5 percent; labor productivity tripled; now five persons successfully began to do the work that formerly was done by fifteen. And what is more, today practically every fifth foundation built with computer help is free, because the savings in materials has reached a minimum of 20 percent and, under the best conditions, 50 percent in comparison with usual design methods.

The total economic effect has exceeded all expectations: just at "Brestgrazhdanproyekt" it has comprised 320,000 rubles, but if one takes into consideration the massive introduction of the system being carried out, it comes to more than 3 million rubles for the republic and 40-45 million rubles on a national scale every year.

Now, there is still more about one result of the institute's computer work. This is data on redesigning foundations according to an order by the BSSR Ministry of Industrial Construction, which was carried out just after the introduction of the line. The authenticity of lowering the estimated cost of designs by 20-30 percent was reaffirmed by the comparison of over 100 sites, foundations for which, after development by traditional method by oblast design organizations, were designed with the help of the "Brestgrazhdanproyekt" automated line. They are striking. We are speaking about standard designs which were being created on the basis of well thought-out, standard solutions to architectural design problems verified many times in practice. Therefore, optimal solutions for a standard design applied in mass construction have significant economic effect. And how does an "assembly line" foundation stand up, the most massive in buildings for civil housing and, at the same time, their general "Achilles heel"? Actually there is not one building in which the computer has not found possible savings.

And still, the outline of this success, even with all of its unusualness and large scale, should not be hidden behind figures--it was created by people.

"In the process of work, a collective grew up and developed which was organized now in the section for design automation," said the section chief, M. A. Tsinman. "And, you know, when we began, many did not believe in the success of this endeavor, and generally we worked almost on an unofficial basis and we were sustained basically by our enthusiasm."

The contribution of those who were first is hard to overestimate. Three years without time off, the small group of enthusiastic engineers labored. S. M. Zuyev, M. A. Tsinman, and N. S. Shikasyuk worked on the concept while carrying out their regular design duties.

A talented young man is maturing and being trained at the institute. This is construction engineer Anatoliy Kachurovskiy, who had not worked in programming before and had not worked with computers. Now he is a competent designer, a qualified user of the automated design system, and a good programmer. And there is the electronic engineer, Vyacheslav Martynenko, who finished Minsk Radiotechnical Institute and, to improve himself, studied computers. Besides being qualified for service in computer technology, he is successfully occupied in programming. At the institute they praise the young prospective programmer, Nina Yakubovich, and the already sufficiently experienced designer Yuriy Kirillov, who is concerned with automated design. If only there were more of them!

The Computer is the Engineer's Ally

At the regular meeting of the party buro there was an intense discussion. The main theme of the conversation did not cause anyone to doubt: again and again thinking over possible directions in the plan for their prospective development.

The basic decision was unanimous--once the thing was begun, well, it was necessary to continue it: to approve for the 12th Five-Year Plan, proposals of the institute, which had been examined in the technical council, for the realization of an integrated program for the automation of design work.

"We began with the assembly-line foundation and, when we complete the automation of the design of the whole 'zero' part of the building, we will thereby automate about 40 percent of the entire work of the designer."

But it is not so simple. Besides the foundation, the "zero" cycle included many no less laborious parts. For example, one of the points of the adopted program sounds like this: "...to create a subsystem for automated design of basement ceilings."

Having gone somewhat deeper into the practice of design, we note that the planning of ceilings is characterized by the large volume of graphic output information. Here also are both the plans for the apportionment of ceiling slabs and the drawings of monolithic sections, specifications for panels, and steel framework for monolithic sections. All of this fully becomes a matter for the machine and allows an increase in labor productivity by a factor of 1.5 to 2.

The creation of a subsystem for automated design of basement walls is becoming an important problem. The correctly selected optimal variant for apportionment of wall blocks is calculated at the same time for the minimum volume of pieces. It provides for the possibility to design basement walls for any housing and civil building in the best way.

...Finishing the conversation about prospects that are found in the section for design automation, let us touch on theequestion of creativity. Will computers participating in the development, let us say, of an individual design, not infringe in some measure on the creative capabilities of man?

Here, both N. S. Shikasyuk and M. A. Tsinman were in agreement: "On the contrary, the designer-architect, in the process of dialog with the computer, can choose the optimal variant from a large number in the shortest time. The institute designers still have a dream of bringing about the automation of the design of a whole building. The architect proposes an idea for construction and then begins the complicated engineering calculations that are lightened to a significant degree by the computer.

After attaining the capability for automated design of a whole building, the collective of the "Brestgrazhdanproyekt" institute intends to solve the problem of variance in designing even in today's standard structures. This, to a significant degree, will contribute variety and harmony to the streets of our cities and will safely permit deliverance from the design of so-called housing "boxes."

9645/9835
CSO: 1863/5

COMPUTERIZED SYSTEM FOR CALCULATING AIRPLANE TAKEOFF PARAMETERS

Moscow VOZDUSHNYY TRANSPORT in Russian 17 Sep 85 p 3

[Article by V. Tseyukov, correspondent]

[Text] An exhibit, "An Automated System for Determining Takeoff Parameters of the TU-134 Airplane, Using a Microcomputer", received a gold and a silver medal and three bronze medals at the spring exhibition NTP-85. The developers of this system are M. Makarov, V. Smykov, M. Lopatinskiy, V. Nosach and V. Polikarpov, scientists of the State Scientific Research Institute of Civil Aviation.

It now takes pilots only one minute to determine takeoff parameters and make a decision. We might say, for purposes of comparison, that this operation formerly took 20 to 30 minutes.

Specialists of the institute recently completed work on employing such a system for the TU-154 airplane. New developments for the IL-86 and IL-76 airplanes lie ahead. The annual economic benefit from the introduction of the computerized system is 391,000 rubles for TU-134 airliners alone.

FTD/SNAP
CSO: 1863/20

COMPUTER GRAPHICS ADVANCE IN MODELING PROTEIN MOLECULES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Sept 85 p 4

[Text] A computer-aided method for modeling the structure of molecules will become a new tool for probing the secrets of matter. Developed by scientists of the Pacific Institute of Bioorganic Chemistry and the Institute of Automation and Control Processes of the USSR Academy of Sciences' Far East Center, the method makes it possible to produce pictures of molecules of complex protein compounds on the screen of a terminal.

Before one's eyes, the computer 'draws' any of 250 molecules, whose diagrams, consisting sometimes of many thousands of coordinates, are stored in an electronic data bank. Moreover, these drawings can be 'rotated' in all planes and enlarged or reduced; different parts of them can be isolated, and cross-sections can be shown. For great clarity, atoms are colored in contrasting shades, and half-tones create a three-dimensional effect.

Scientists working in the most diverse fields--biologists, chemists, geologists and medical personnel--have immediately become interested in this innovation. After all, until now they were confined to the use of mechanical models to show the structure of molecules. And it takes months of hard work by even an experienced specialist to create such a mock-up.

FTD/SNAP
CSO: 1863/6

'INFORMATION BANK' IS OPERATING

Moscow PRAVDA 13 Sept 85 p 2

[Article by PRAVDA correspondent G. Lebanidze, Tbilisi, subtitled "Route of Technical Progress."]

[Text] At the Institute for Scientific and Technical Information and Technical and Economic Research, we met with the chairman of the republic State Committee for Science and Technology, I. Zhordaniya, doctor of engineering sciences, and the director of the institute, O. Shatberashvili, candidate of physical and mathematical sciences. The conversation began with a facetious request: "Suppose I wanted to invent the bicycle. Could you come up with the necessary information?

The request was given to the machine. The magnetic discs began to whirl and turn, and the search had begun. Soon the machine began to print out: a complete bibliographic list of patents and inventions under the classification "bicycles, mopeds, etc." It turned out that from 1920 up to 1984, 4,447 were registered in the world. For the whole operation, it took...15 minutes.

And if you did it in the old way, by catalogs, it would take no less than two to three months of intensive labor. Here, they reported to me that there are over 14 million patent documents registered in the world and every year hundreds of thousands more are added to the total.

"At the present time, when the party sets the goal for us of truly bringing about revolutionary measures for the development and introduction of innovations," says I. Zhordaniya, "it is difficult to overestimate the role and significance of information.

Indeed, what kind of technical progress would there be to speak of, if the scientist or designer did not have the necessary information at hand at the right moment?! It has been calculated that the search for information takes about 40 percent of the worker's time.

At the institute, they cited this example: Fifteen specialists by hand are able in a year to process 60,000 documents and satisfy requests from 345

subscribers. "But our computer," says the chief designer of the republic automated scientific and technical information system, T. Chkhenkeli, "during the same amount of time, processes about 1,720,000 documents and satisfies many thousands of requests from our subscribers. And the system is served by a total of five people."

The Georgian Scientific Research Institute for Scientific and Technical Information is the head institute in the republic scientific and technical information system. In it there are now over 280 services, including 214 in Tbilisi, 12 in Kutaisi, 11 each in Sukhumi and Batumi, 7 in Rustavi, and 4 in Poti. The institute has created a guide to the republic united reference information holdings. It includes the holdings of the Scientific and Technical Library imeni G. Mikeladze, six large leading libraries of the republic, nine base organizations of industries and subindustries, and 46 republic organizations and enterprises. Within the framework of the state automated scientific and technical information system, the institute widely cooperates with related institutes and academic libraries in Armenia and Azerbaijan, and also works closely with the All-Union Institute for Scientific and Technical Information for the Social Sciences, the Library for Natural Sciences of the USSR Academy of Sciences, the International Center for Scientific and Technical Information, the "Poisk" Scientific Production Association of the USSR State Committee for Inventions, and others.

The institute collects, analyzes, evaluates, compares, and summarizes scientific and technical achievements in the basic areas of the republic economy.

It would seem, at first glance, that subscription to periodic literature would be a simple matter. It turns out that its rational organization can be managed with many advantages. With computer assistance, the institute, according to arrangement with "Soyuzpechat," has effected subscriptions to newspapers and journals and also to publications of USSR information organizations in large libraries of the republic. The labor of librarians has been lightened significantly, and a new machine-reading search apparatus has been treated, simultaneously allowing coordination of subscriptions and eliminating duplication and parallelism. In the future, an expansion of this work is planned to foreign journals.

In the republic, automated search for scientific and technical information, besides that of the Georgian Scientific Research Institute of Scientific and Technical Information, at the social science information center of the republic Academy of Sciences, at the Institute of Computer Mathematics of the GSSR Academy of Sciences, the republic section for scientific medical information, the "Analitpribor" scientific production association, and others.

"It is important that all these services make up a powerful interindustry information complex that meets the needs of the region," says O. Shatberashvili, "and their broad cooperation should be arranged on the

basis of unified technology and this, in the final analysis, will permit increasing the information capacity of the united holdings, to curtail its unwarranted growth, to provide rational expenditure of funds for the acquisition, storage, and distribution of domestic and foreign sources of information to the consumer.

The industry of informatics is now becoming a branch of the economy like, for example, transportation, communications, and power. Only within the last year in the republic, the economic effect from the introduction of scientific and technical achievements totaled over 21 million rubles, which was double the expenditures for scientific and technical information in the republic.

9645/9835
CSO: 1863/5

UDC 62-50:531.3

ALGORITHMS FOR AUTOMATIC FORMATION OF THE ENVIRONMENTAL MODEL OF A TRANSPORT ROBOT

Kiev KIBERNETIKA in Russian No 4, Jul-Aug 1985
(manuscript received 23 Apr 81) pp 98-102

MELEKHIN, VLADIMIR BORISOVICH, senior engineer-electronics, Dagestan Polytechnical Institute, Makhachkala

[Abstract] This paper is concerned with one of the approaches to automatic formation of the environmental model of a transport robot. The approach is based on the self-organization principles of living systems. The content of algorithms for self-organization of transport robots, and a study of these algorithms are considered. Figures 3; tables 1; references: 5 Russian, 1 translated from English.
[8-6415]

UDC 007.52

DECENTRALIZED PLANNING AND CONTROL SYSTEM FOR THE ACTIVITIES OF A COLLECTIVE OF TRANSPORT ROBOTS

Kiev KIBERNETIKA in Russian No 4, Jul-Aug 85
(manuscript received 25 Apr 82) pp 93-97

KALYAYEV, IGOR' ANATOL'YEVICH, graduate student, Taganrog Radio Engineering Institute

[Abstract] A possible method is proposed for organization of a system of planning and control of the activities of a collective of transport robots, functioning within the limits of a production shop "single complex world." This makes it possible to provide parallel solutions of all conflicts, originating between robots of a collective in the process of their common simultaneous activity. The possibility is also shown of realizing a similar system based on computational structures which makes it possible to attain the speed of response level of a system which is necessary for control of a transport robot collective in real time. Figures 4; references 4: 3 Russian, 1 non-Russian.
[8-6415]

UDC 631.3:65.015.001

PROSPECTS FOR USE OF MICROPROCESSORS IN AGRICULTURE TECHNOLOGY

Moscow TRAKTORY I SELKHOZMASHINY in Russian No 7, Jul 85, pp 8-12

LOMAKIN, B. M., engineer, NAKONECHNYY, I. I., candidate of technical sciences, and NIMITINA, G. Ya., NPO [Scientific Production Association] "Viskhom"

[Abstract] Contemporary agriculture is characterized by an always increasing introduction of the industrial technology of cultivation, harvesting, post-harvest processing and storage of agricultural production, which requires the use of complex machines and their systems. The present paper is concerned with the fact that effective use of such technology in agriculture cannot be assured without the latest means for automatic monitoring and control, based on the latest achievements in microelectronics, in particular microprocessors. Typical systems of automatic control and signalization are briefly described. In the USSR at present, with the participation of specialists from a number of members of the Council for Mutual Economic Aid, work is being conducted on the creation of means for automatic monitoring and control of machine and tractor equipment (MTA) with the use of microprocessor devices, including: 1) Information measuring systems for optimum control of the performance of agricultural tractors; 2) Systems for automatic protection of tractor and combine motors; 3) Self-adjusting systems of automatic control of the energy performances of MTA with a gear box switched on the move; and 4) Systems of integrated automation of grain-, corn- and beet-harvesting combines. Up to 1985 programs for the development and mastering of series production of the means of automation with the use of microprocessors have been provided for seven complex agricultural machines: grain-, corn-, beet-, and potato-harvesting combines, thinning out of young sugar beets, and self-propelled machines for placement of fertilizer. The number of such automated objects for postharvest processing of grain, vegetables, and fruits must increase substantially by 1990, basically on account of fixed points, production lines, and technological complexes. The paper emphasizes the fact that microprocessors are only a technical base for automation, and, consequently, for all practical purposes, prospects for their use depend on the prospects for automation, which, as this is confirmed by many decisions of the party and government, seems promising. Figures 3.
[2-6415]

UDC 65.012.122:639.22

ALGORITHMIC METHODS IN PROBLEMS OF FORECASTING OCEANIC FISHING GROUNDS

Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 6, Jun 85
(manuscript received 13 Mar 84) pp 117-127

VORONOV, A. A., GOLDMAN, R. D. and ILICHEV, V. I., Moscow, Murmansk and Vladivostok

[Abstract] The impact of such environmental factors as El Nino and water temperature on the yield of fishing grounds is well-known. However, the correlation of the voluminous available hydrological data for large ocean areas with fish shoal movements and concentrations requires the use of computerized data reduction in order to ascertain optimal fishing areas. This paper describes the logic models and data reduction algorithms used for preductions based on surface water temperatures and previous movements of the fishing fleet. The hydrological maps are broken down into elementary squares with known latitudes and longitudes forming the basis for the model analysis of the charts. The software described here has been successfully applied to data from 1968 through 1981 in forecasting fish population centers in the Pacific Ocean. Figures 5; references 9: 8 Russian, 1 Western.
[398-8225]

UDC: 002.6.001.57:61.001.5

MODELS OF INFORMATION STREAMS IN A MEDICAL SCIENTIFIC TEAM

Riga KIBERNETIKA I INFORMATIKA V MEDITSINE in Russian 1984
(signed to press 22 Jun 84) pp 157-171

VEL'KOVICH, L. Ya., RUDZITE, T. L., BLAD, A. R. and GUTMAN, O. V., Riga

[Abstract] The study was performed in three stages. In stage one to produce more detail for the picture of information connections in a scientific medical team, a conceptual model was developed, utilizing the concept of the nature of information processes in medicine developed previously by the same authors. The second stage involved the study of the statistical regularities of the streams of information revealed in the first stage. Data were collected on several specialized scientific centers including scientific teams from the Riga Medical Institute, including the Hepatologic Center, Kidney Transplant Center, Cardiovascular Surgery Center, Experimental Surgery Center, Neurosurgical Center and the Cardiology Center by recording characteristics of documents from the stream of orders submitted for publications and lists of references cited in works published by the teams in 1981-1982. In the third stage, the information streams of the medical teams were described by a model which

represents an interpretation of the concentration-scattering of information suggested by Bradford and Vickery. The team of medical scientists is proposed as the basic structural unit of information processes in medical science. Figures 4; references 28: 20 Russian, 8 Western.
[467-6508]

UDC: 002.6:311.14:61.001.5

SCIENTOMETRIC INDICES OF SCIENTIFIC TEAMS OF SPECIALIZED MEDICAL CENTERS

Riga KIBERNETIKA I INFORMATIKA V MEDITSINE in Russian 1984
(signed to press 22 Jun 84) pp 198-213

RUDZITE, T. L., VEL'KOVICH, L. Ya., GUTMAN, O. V., BLAD, A. R., PEKARSKAYA, D. I. and POPOV, V. V., Riga

[Abstract] A comparative study was performed of certain characteristic information streams in scientific teams included in specialized medical centers of the Latvian Ministry of Health. Materials for the study were representative characteristics of two main information streams: the flow of requests for scientific documents passing through the information center and the flow of scientific documents cited in publications generated by the teams. These two streams were studied using a group of scientometric methods. The distribution of requests by languages and countries of publication indicated that English represented 54-82% of all publications requested, English puls French plus German 86-99%. Content analysis indicated that teams working primarily on laboratory studies ordered different types of documents from teams involved in clinical studies. It is recommended that efforts be concentrated on the provision of non-journal sources of information, particularly unpublished sources. Better organization and analysis of documents published in the Soviet Union on priority problems is required. Specialists should take more active part in formulation of requests for foreign literature, and in involvement of information from a braoder range of publications in the information process. Figures 4; references: 9 Russian.
[467-6508]

UDC 681.322

ARIEL' SYSTEM FOR SOLVING CALCULATION PROBLEMS IN INTERACTIVE MODE

Moscow VESTNIK MOSKOVOSKOGO UNIVERSITETA SERIYA 15 VYCHISLITELNAYA MATEMATIKA I KIBERNETIKA No 3, Jul-Sep 85 (manuscript received 20 Apr 84) pp 67-71

BORISOV, V. M. and HERNANDEZ-PILOTO, E.

[Abstract] The paper describes the ARIEL' system, which is intended for the solution of certain computational mathematical problems in an interactive mode. Some contemporary trends of development of dialog problem-oriented systems are taken into account. The fundamental principles at the basis of creation of the ARIEL' system are presented. The first version of the ARIEL' language developed at present for the SM-3 electronic computer includes means for the solution of certain problems of numerical analysis. Programs of this version are written in Pascal using operating system FOBOS. The following items are studied: 1) Characteristics of ARIEL' system; 2) Input language of ARIEL' system; and 3) The prospects for development of the ARIEL' system. References 12: 8 Russian, 4 non-Russian.
[3-6415]

UDC 62-50: [522.2: 523.164]

SHAPE CONTROL OF PHASE FRONT CORRECTORS IN LARGE RADIO TELESCOPES

Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 8, Aug 85 (manuscript received 28 May 84) pp 5-14

BELYANSKIY, P. V., and MUSTAFAYEV, M. I. (Moscow, Baku)

[Abstract] This paper, which pays particular attention to shape control of the reflecting surface of phase front correctors in large radio telescopes, is concerned with shape control of distributed mechanical systems such as plates, hulls, or diaphragms, using a finite number of control signals. Operational recording and model presentation of displaced phase correctors, shape control of phase correctors with feedback, and problems of a choice of the number and arrangement of sensors and actuators are considered. An an example, the problem is studied of compensation of phase-frequency distortion in the aperture of a two-mirror radiotelescope by control of the shape of the phase correcting element, as which a plane rectangular membrane is used. Figures 4; references 10: 7 Russian, 3 non-Russian.
[7-6415]

UDC 681.323

RESEARCH ON PRODUCTIVITY OF SPECIALIZED COMPUTER STRUCTURE FOR NETWORK ANALYSIS

Kiev ELEKTRONNOYE MODELIROVANIYE in Russian No 1, Jan-Feb 85
(manuscript received 18 Oct 82) pp 13-19

KIREYEV, L. N., KOTLYARENKO, A. A. and PELEKHOV, S. P.

[Abstract] Fourth generation computers forming networks have been developed and are faster than single general-purpose computers. Many of the problems involve the theory of graphs and netowrk solution algorithms which amount to the analysis of paths and branch characteristics for assigned criteria. Several algorithms for network analysis have been developed for general-purpose computers with sequential processing but his is expensive in machine time (of the order of several minutes). Specialized structures were also developed based on the parallel organization of processes and these have the advantages of multiprocessor systems. A modelling algorithm is discussed based on the principle of the wave propagation of a signal creating a disturbance front in the network which is set off by a certain node and ends at another and this determines the length of the branch. The algorithm is realized on specialized systems involving parallel-sequential modelling of branch lengths in the process elements with counting and storage of branch and initial and final node addresses. The organization of the process elements can be either static or dynamic, i.e., elements are either assigned fixed tasks or are repeatedly released and reused. Several network modelling systems such as ASOR, Ritm and Struktura can realize the static system. This is compared with another realization utilizing dynamic structuring. Analysis showed that for a constant number of branches (1000) the structure with a static distribution of process elements is faster than the dynamic only for networks with less than 8 nodes when it can utilize four process elements practically in parallel but for more than 10 nodes dynamic distribution is much faster and for average networks with approx. 250 nodes the advantage attains two orders of magnitude. It is mentioned in passing that the YeS-1020 has a clock pulse of one Megahertz.
[339-12497]

UDC 621.38.001.572

FUNCTIONAL MODEL FOR TECHNICAL EQUIPMENT (F-MODEL)

Kiev ELEKTRONNOYE MODELIROVANIYE in Russian No 1 , Jan-Feb 85
(manuscript received 30 Jun 82) pp 86-91

VERSHINA, A. I. and RAUBISHKO, S. S.

[Abstract] A model of the dynamic behavior of a system is often required for design purposes when the effect of the input depends upon entry time. Of the many available models funciton state diagrams have not been sufficiently explored and the paper proposes an F-model, based upon Moore automata methods, which is an extension of the state diagram approach and reflects time relations. The basic concepts are discussed. The F-model contains the rule for transform of input into output variables occurring in discrete time steps and the functioning of the model consists of establishing, at each step, the new state which may coincide with the previous one. Out put is unequivocally determined by the model state and each final state is coded as a vector whose components are the output variables. The basic special feature is the use of current time values which accompany all variables and indicate the time step at which a variation occurred. F-models have a single state variable and can be used for the modelling of any type of equipment. If the single state variable is not convenient a structure can be set up consisting of an aggregate of F-models which can cover several variables for different elements of the modelled unit. If inputs vary rapidly, it is possible to establish a dynamic F-model in which there is sequential propagation of a wave of variations. The model can be represented in state diagram is very satisfactory. Synthesis of electronic circuits by means of F-models is not simpler than by other methods but has the advantage that time constrained elements (monostables, etc.) are treated in the same way as other elements (logic elements, etc.) and the model is recommended for the synthesis and analysis of electronic circuits operating at limiting frequencies or with time constrained elements.
[339-12497]

UDC 621.311.22.002

PRECISION REQUIREMENTS FOR DYNAMIC MODELS OF TRAINING SIMULATORS

Kiev ELEKTRONNOYE MODELIROVANIYE in Russian No 1, Jan-Feb 85
(manuscript received after revision 27 Oct 83) pp 81-85

PLYUTINSKIY, V. I. and OKHOTIN, V. V.

[Abstract] Training simulators are used for preparing operators for the control of power generating units. The development of adequate models of the unit is a complex task requiring significant computer resources for

modelling on simulators. Various approaches for error evaluation include fixing error values, quality criteria and random error criteria. The GOST 20921-75 standard requires a similarity criterion evaluating the adequacy of man/machine interaction amounting to an evaluation of the probability that the operator will successfully control the object but it is difficult to establish the evaluation in practice because of problems involved in setting up actual experiments and the psychological reactions which occur. It is proposed to compare operator control directly on the trainer by simulation of disturbances in relation to standard states. Adequacy is evaluated on the basis of recognition and discrimination of variations in the dynamic processes. The operator is at the console of a trainer with a color display showing standard states on which are superimposed digitally variations in states. There are two modes of reaction: active, involving control of the object and passive, in which states are only monitored. A measure is introduced for characterizing the degree of discrimination and in the simplified version given in the paper, a class of transforms is used which converts the standard state into disturbed states and whose parameters characterize the deviation. In the paper only transient (especially oscillatory) processes involving different gain and time scale coefficients are used. Repeated tests in which the operator attempted to discriminate or correct deviations were processed and the probability of adequacy was evaluated. Passive mode discrimination was found to be better than active mode responses. The method for error evaluation can be extended from time scale and gain coefficients to more complex models with large numbers of parameters.
[339-12497]

UDC 681.34

COMPUTER MODELLING OF ADAPTIVE SIGNAL CONVERTERS

Kiev ELEKTRONNOYE MODELIROVANIYE in Russian No 1, Jan-Feb 85
(manuscript received after revision 17 Mar 83) pp 94-98

BULYANOV, V. F., ZAKHAROV, I. I., KURITSYN, A. S. and PERFIL'YEV, E. P.

[Abstract] It is not economically feasible to build experimental signal converters incorporating various characteristics. A program was developed for simulating converters for a broad class of signals on models of channel links. The flow chart is a series of blocks in which the channel link block models frequency, phase and spectral features; the information block models the linear signal and channel noise by introducing signal distortions; the filter block corrects the signal and noise readings and a simplified procedure for filter optimization is possible and special subblocks can be introduced for systems receiving data with unknown statistical characteristics; the coefficient adaptation block models adaptive correction and synchronization systems and the last block documents initial parameters and final results including the mean square error for symbol estimates and also produces graphics of results. The procedure makes it possible to study

different design variants and evaluate algorithms while different algorithms can be introduced for specific problems. The program structure is convenient and clear and accurately represents the main stages of signal transforms in real data transmission equipment. In actual equipment 70% of the volume of the unit consists of the adaptive corrector circuit, while in digital computer realizations of conversion 70% of the time is expended on the adaptive correction algorithm. Since the number of computations depends on the number of taps of the adaptive corrector, optimization of the number of taps is an important design problem. The program can also study various adaptation algorithms. A session involving 2000 information symbols which is considered sufficient for evaluating parameters was modelled in about 15 minutes on a YeS-1022 computer.
[339-12497]

UDC 681.3.068

COMPUTER-AIDED DIAGNOSIS OF DISCRETE ACTIVITY OF AN OPERATOR

Kiev AVTOMATIKA in Russian No 3, May-Jun 85
(manuscript received 6 Jul 84) pp 64-68

ROTSHTEYN, A. P., Vinnitsa

[Abstract] The discrete activities of a human operator are represented in the form of sequential chains whose elements correspond to the operations performed. The activity is diagnosed in order to identify the locations and types of errors relative to some reference structure. This paper proposes an adaptive algorithm for the comparison of the actual performance structure with a reference standard, thus enabling the automation of the diagnosis. Techniques for limiting the machine time required for an exhaustive search of all comparison variants are described. The efficiency of this algorithm, which is based on a branches and bounds analysis of the time sequences, is estimated in terms of the average machine time for diagnosing a chain, the probability that a chain will be fed out from the computer for visual analysis and the probability of a false diagnosis of the given chain. Analytical expressions are derived for these probabilities and illustrated with a numerical example showing a typical false diagnosis probability of less than 0.002. The proposed algorithm has been used in a package of applied programs for display operator performance. Results of experimental studies of an "operator--display" system using this package are described in the literature. References: 5 Russian.
[392-8225]

THEORY OF COMPUTATIONS

UDC 618.513

ON ONE APPROACH TO FOUNDATIONS OF FUZZY SET THEORY

Kiev AVTOMATIKA in Russian No 3, May-Jun 85
(manuscript received 4 Jan 85) pp 15-18

SADOVSKIY, A. L., Moscow Institute of Railroad Transportation Engineers

[Abstract] The fundamentals of fuzzy set theory as proposed by Zadeh involve the following unresolved problems: 1) The existence of different types of fuzzy sets; 2) Questions of the completeness or the noncontradictory nature of the theory itself. This paper adduces seven axioms and two theorems which circumvent the above difficulties. If the membership function of a given fuzzy set itself is also a fuzzy set, the former given set is called a type 2 fuzzy set. A fuzzy set is a type N if the values of its membership function are type (N - 1) fuzzy sets. Mathematical induction applied to these and the remaining axioms generates theorem 1: an equivalent fuzzy set of type 1 corresponds to any fuzzy set of type N in the proposed axiomatic system; the adduced principle of closedness makes it possible to work just with conventional fuzzy sets, i.e. those of type 1. Theorem 2 states that the fuzzy set theory defined by these axioms is not contradictory within the proposed systems. No detailed derivations of the theorems or axioms are provided.
References 9: 5 Russian, 4 Western.
[392-8225]

UDC 519.176

PSEUDOPOLYNOMIAL PARTITIONING ALGORITHMS FOR SPECIAL KIND OF GRAPHS

Kiev AVTOMATIKA in Russian No 3, May-Jun 85
(manuscript received 3 May 84) pp 18-25

FLEYSHMAN, S. B., Moscow

[Abstract] Some of the objects of different weights in a set are tied together by connectives having different strengths (values). It is required

that this set be partitioned into subsets so that the total weight of the elements of each subset does not exceed a specified level and the number of subsets is no greater than a set limit, while the overall strength (value) of the connectives between the elements occurring in the different subsets is minimal. The solution of the problem of partitioning such a weighted set into no more than K subsets does not fall within the class of solutions for NP-complete problems, for which polynomial algorithms exists. However, for any fixed value of K greater than 2, the graph partitioning problem here is NP-complete in the strong sense (reducible with a pseudopolynomial algorithm). This paper treats the definition of the family to which the set of graphs belong, the description of the algorithm and the proof of its pseudopolynomiality. The technique is applied to the specific example of the partitioning of a five-vertex graph (four of the vertices have weights of 1, and the fifth has a weight of 2) with edge weights of 3 for one edge, 1 for three edges and -1 for the remaining edge, where the set of vertices must be partitioned into two subsets so that the total weight of the vertices of each subset is no more than 3 with a minimal total weight of the partitioned edges. The five step algorithm is shown in tabular form. Such algorithms, which are based on dyanmic programming, are sufficient for such graphs as trees, cacti as well as more general forms, without requiring excessive computer speed. Figures 2; references 6: 4 Russian, 2 Western.
[392-8225]

NETWORKS

UDC 681.31:65.012.122

ANALYTICAL AND NUMERICAL SIMULATION OF DATA TRANSMISSION PROCESS IN COMPUTER NETWORK BETWEEN PAIR OF SWITCHING NODES WITH COMMON BUFFER FOR INPUT AND OUTPUT PACKETS

Novocherkassk ELEKTROMEKHANIKA in Russian No 5, May 85
(manuscript received 12 Apr 84) pp 35-40

ZUYEV, V. A. and CHERNOMOROV, G. A.

[Abstract] A computer net contains computers combined in local groups and has two packet switching nodes for data exchange between computers. One of the local groups can tie into the computers of the central computer system while the other can link up with the local minicomputer net servicing the user terminals and the control and monitor hardware. The input and output queue in a p cket switching node are set up in one common buffer with a fixed capacity. This limited capacity can create the following situations: 1) Failure of a switching node to receive a packet from a local computer or another switching node; 2) Blocking of packet transfer between switching nodes; 3) Clinching, i.e. mutual blocking of a pair of nodes; 4) Packet reception failure by another switching node. A quantitative measure of computer net degradation is the probability of the occurrence of these four situations. The problem of minimizing these probabilities is formulated taking into account the mutual blocking of the transmission of transit packets between switching nodes. The analysis is based on a conceptual and mathematical model of a pair of nodes; the essence of this modeling is the use of embedded Markov chains or a matrix to generate analytical expressions for the determination of the elements of a transfer probability matrix or an infinitesimal matrix, while the values of the steady-state probability distribution vector are determined by efficient numerical methods of solving systems of linear algebraic equations that take the structure of the matrices into account. The packet switching node pair model is described and the simulation was run on an SM-4 computer using Fortran-IV for the real time operating system. The simulation of the transmission of 10^5 packets took 16 minutes, 39 seconds of YeS-1033 machine time. The model allows minimization of the average queue wait time and the determination of the minimum buffer size. Figures 2; references 6: .5 Russian, 1 Western.
[393-8225]

EDUCATION

"ELEKTRONIKA MK-72" WORKPLACE AND TEACHING MICROCOMPUTER

Kiev PRAVDA UKRAINY in Russian 11 Sep 85 p 4

[Article by A. Sokol, correspondent]

[Excerpt] A group of designers of the "Kristall" production association in Kiev has developed a microcomputer, the "Elektronika MK-72". This new computer can be used in industry--it can control machine tools or robots, for example--and it is capable of serving also as a means of instruction. Our article concerns this latter application.

The new machine continues a series of microcalculators which "Kristall" has been producing for more than 10 years. They are not conventional calculators but programmable ones.

The "Elektronika MK-72" has inherited some of the simplest functions of a calculator, to be sure. It can calculate and compute, for example, but its principal merit is that it carries on a dialog with humans (by means of texts on its screen), and it memorizes, stores and processes information.

"Teaching computers should be like ones found in the workplace, in our opinion," related Candidate of Physical-Mathematical Sciences V. Zakharov, chief designer of the "Elektronika". "Teaching computers should not be over-simplified. Students must learn to converse with them and create programs, and not just perform certain operations mechanically."

One would hesitate to call the "Elektronika" a computer on the basis of its appearance. It is about the size of a book. It has its own miniature panel. But the dancing figures and letters of codes appear elsewhere; information is displayed on a terminal placed next to it. And if a special deck is connected to the computer, information readout can appear on the screen of an ordinary television set.

The computer can perform up to 500 operations a second. The "Elektronika" is priced at roughly 150 rubles. It is intended not for whole classes, but for individual pupils. Specialists maintain that workplace computers shouldbbe just this type--personal ones. It is the very kind that is needed by everyone, from school students to officials of ministries.

Preparations are now being made to produce a test lot of "Elektronika MK-72" computers.

FTD/SNAP
CSO: 1863/20

ROUND TABLE DISCUSSION ON USE OF COMPUTERS IN GEORGIA

Tbilisi ZARYA VOSTOKA in Russian 21 Jul 85 p 2

[Interview by correspondent Ketevan Amiredzhibi with various Georgian functionaries: "The Computer as a Partner"]

[Text] The need to raise decisively the requirements on the training of tomorrow's specialists is dictated by the fundamental acceleration of scientific and technical progress, defined by the April (1985) plenum of the CPSU Central Committee as the main strategic lever for intensification of the national economy. An important position in implementing this large-scale program has been allocated to problems of using computer technology in the academic process. How this problem is being solved within the framework of higher and secondary general education schools of the republic is the topic of round table discussion, in which acting Academician-Department Secretary of Mathematics and Physics, Georgian SSR Academy of Sciences, Corresponding Member of Georgian Academy of Sciences Dzhumber Lominadze, director of the intervuz Computer Center of the Georgian SSR Minvuz [Ministry of Higher Educational Institutions], candidate of physicomathematical sciences Kote Tsiskaridze, scientific manager of laboratory of methods of instruction in computer hardware of GPI [Georgian Polytechnical Institute] imeni V. I. Lenin, Candidate of Technical Sciences, Docent Georgiy Turkiya, Dean of the Physics Faculty of TSU [Tbilisi State University], Professor Ivan Vashakidze, Manager of the Department of School Informatics, Ministry of Education of the Republic, Candidate of Physico-mathematical Sciences Aleksandr Eligulashvili and ZARYA VOSTOKA correspondent Ketevan Amiredzhibi participated.

[Correspondent]. Computer technology is now arriving rapidly at the work-stations, but the lack of preparation to work with it sharply reduces its effectiveness. For example, the case occurred when a galvanic line was produced with great difficulty at one of the all-union enterprises. Having become familiar with the technical documentation, the plant technicians discovered with great consternation that the line is controlled automatically by microprocessor, but the plant did not receive the programs for the micro-processor. They tried to "knock out" these programs, but they soon had to give this up, since the programs cost as much as the entire line. Thus they had to immobilize the entire control system so that it did not interfere.

[Lominadze] The given example is yet another example of the irresponsible attitude of people. And of course the main problem is still the shortage of specialists capable of intelligently using computer technology. Of course we are talking not only about the given case--there is a shortage of these personnel in all spheres of the national economy.

We at the Academy of Sciences recently held an expanded scientific meeting of the department with participation of many scientific and sector institutions on problems of using computer technology in the most diverse fields of knowledge, icluding scientific research, in the academic process of higher and secondary schools and so on. The intense interest in these problems was not accidental. All industrial countries are turning to completion of the industrial revolution, related to automated data processing, in other words to the phase of continuous informatization of society, at the juncture of the third millenium, and this means that the role of the computer in today's life can be compared to the role of the television or the book. Computer technology has been transformed to the main partner of man.

[Eligulashvili] This means that the use of computer technology in teaching has already become an indispensable necessity. I feel that there is essentially no age limit to the beginning of familiarization with the computer. The thesis is quite appropriate here. The school providing general education does not at present have massive access to computers and this seems to be reflected significantly in the quality of training of the adolescent population for labor. True, occupational orientation of students for working on computers was begun in the late 1970's in some regions of the country. It was this way, for example, at the schools of Novosibirsk Akademgorodok, Sverdlovsk and Penza. The students received orientation toward occupations, directly related to programming and working with computers. Work was also begun in this direction in Georgia in the 1960's. But these were only single experiments.

[Correspondent] If one proceeds from the given examples, this means that the computer and programming should certainly become a subject of school training. And this is a very specific area of activity that requires a special mindset and special capabilities of man. And if these do not exist?

[Eligulashvili] Of course, programming should only become the second literacy only for people of the appropriate occupational orientation. Everyone says with regard to students that they should now be given real access to computers. The decision of USSR Minpros [Ministry of Education] on universal study of the new discipline "The fundamentals of informatics and computer technology" in the schools was not made accidentally. I repeat we are talking primarily about study of the fundamentals of a discipline and this is just as necessary, let us say, as studying the fundamentals of mathematics.

For a number of years, as an experiment, we in the republic have conducted exercises in studying the fundamentals of computer technology and programming at two schools in Tbilisi. The accumulated teaching experience made it possible to expand the scales of training. The Ministry of Education of the republic entered with a proposal to the Georgian SSR Council of Ministers on bringing in the computer centers of different ministries and departments as host organizations with their using the material and technical base and leading specialists as instructors.

And since the 1984/1985 academic year, 9th grade students of 26 Tbilisi schools have begun to study the fundamentals of programming and computer technology in the specialty "programmer-technician." It is natural that over time an ever greater number of students will master the fundamentals of this specialty. Of course, it now difficult to say whether today's students will need a knowledge in the field of programming tomorrow. But one must look at things not only from the aspect of short-term, but of long-term prospects as well. And this view forces one to evaluate differently the current situation. Of course, it is now difficult to state that computers will become permanent aids of man as a new system of preserving social memory. But this is obviously how it will be. And this prospect favors the opinion that everyone should sooner or later be trained in programming.

[Turkiya] This situation and the problems are valid even now with respect to the higher schools. A modern specialist with technical education, and even with some types of education in the humanities, must even now use computer technology and subordinate it to himself. But everyone does not yet have these skills. And this is understandable: the problem of working in close partnership with computers even a little more than 5 years ago was not acute for many specialties. Hence the "gaps" in the academic process. But some experience has already been accumulated and something has been analyzed. The working experience of the Georgian Polytechnical Institute in this direction shows that broad introduction of computer technology should be carried out not only by a quantitative increase of computer hardware and microprocessor technology, but also by searching for realistic methods and possibilities of using these devices for a number of engineering specialties. For example, we have already undertaken specific steps to support the profiling disciplines for some departments and specialties--computers and programming. Thus, besides the department of automation and computer technology, we have created chairs of computer-aided design for the specialties "mining-geology," "construction-architecture" and departments of SAPR [computer-aided design system] are functioning in machine building, and the department of computer technology in engineering-economic computations is active. It is planned to create a similar department in the near future for power engineering specialties. This approach will make it possible in the near future to restructure considerably the training of engineering personnel.

The Georgian Polytechnical Institute imeni V. I. Lenin is the largest vuz in the republic. Personnel are trained here in 70 specialties. And each of them requires individual software. The program complexes are now being developed at different institutes and scientific centers, including our polytechnical institute.

[Vashakidze] Specific experience has also been accumulated at Tbilisi State University, specifically at the physics faculty, where the computer is used both in the academic process and in scientific research work.

Our academic process is structured so that up to 250 hours are allocated to study of computer technology and problems of practical use of it. Is this a lot or a little? It is a lot. But it is obviously impossible to do otherwise. Practice has showed that it is impossible to solve most problems in physics without the partership of the computer and this means that each

physicist should know and use its capabilities and know how to work in close contact with it. Of course, this concerns not only physics. Automation of research is necessary, as was emphasized at the Sixth Plenum of the Central Committee of the Georgian Communist Party, for any field of knowledge. We at the faculty in the specialty of "physics" were the first in the country to introduce a new specialization--"microprocessors and microprocessor systems," academic plans and programs were compiled and a student scientific design office was created. And for the future we have planned to introduce the broad use of microprocessor systems into the practice of all laboratories of the faculty.

[Tsiskaridze] In rephrasing the well-known saying, one can state that all roads now lead to computers. The use of computer hardware qualitatively changes our capabilities in literally all fields of activity, including the system of education and personnel training. The clearest example is current servicing of admissions examinations at vuzes using computers. The work efficiency of the admissions committees increased appreciably during the first few years of using computers. However, time has prompted new levels of using computer technology--in planning admissions according to specialties, deployment and subsequent probationary service of young graduates of higher schools and of secondary specialized academic institutions at the work place with regard to the needs of individual regions and of the national economy as a whole, in the field of employment of young people who have not passed the composition for higher education and so on. Computer technology can be use successfully within the framework of the unified intervuz competition on related specialties. These competitions, incidentally, are already held in some countries.

[Turkiya] The computer is inserting itself more persistently into the activity of man, but lack of preparation for communicating with it clearly reduces the effectiveness of this work. One obviously must approach very seriously problems of training and retraining specialists that use and service computer hardware. This can be accomplished on the basis of special centers. One of these in the framework of one of the all-union associations was created at Tbilisi. More than 3,000 specialists in our republic and other cities of the country have already been trained in different specialties. Moreover, the center is conducting scientific research and experimental design work on developing methods of using various types of hardware in teaching, and automated training courses have already been developed and introduced there, which considerably raised the quality of specialist training. The students are also gaining access to the latest technology. Students of the polytechnical school are being trained at the center on the basis of partnership with the Georgian Polytechnical Institute--course projects are being fulfilled and computer hardware is being used in working out many engineering problems. The students are completing production and pregraduation practice and future engineers are participating as an experiment in working out new software and operation of computer hardware.

[Vashakidze]. This experiment has also touched students of the faculty of cybernetics and applied mathematics of Tbilisi State University since last year, who also gain practice at the center from the first courses.

[Eligulashvili] The specialists of the center have already been conducting exercises for the first year among a circle to study one of the "programming languages" and practical exercises in computers with students of the junior classes of Tbilisi Secondary School 116. Since last year, a course of programming and computer technology has been conducted with upper classmen of the Tbilisi Secondary School 22 and further expansion of work in this direction is planned. For example, it has already been decided to begin construction through the center's funds of a specialized children's pioneer camp at Tskhvarichamiya village, where a school of young programmers and electronic specialists will be created. The base of this school is being equipped with the most modern computer technology.

[Correspondent]. Mastery of computer literacy is impossible without creating a strong material and technical base. What is the program of work in this direction.

[Eligulashvili] The role of microelectronics, computer technology and instrument building and of the entire information industry, called catalysts of progress, was especially emphasized at a meeting of the CPSU Central Committee on problems of accelerating scientific and technical progress. The production of computers for all spheres, including the sphere of education, must be increased in this regard. For example, the Agat personal computer, developed especially for schools, has been prepared for serial production. Other computers, up to personal computers, will be manufactured in the near future. The schools will gradually be able to become equipped with computer technology. True, this process will primarily touch the schools of large cities. And with regard to rural schools--they will clearly lag behind in equipping with computer technology. The problem, so to speak, is a serious one. So that now is the time to begin study of it and to make specific decisions.

[Turkiya] And the higher educational institutions do not have enough computer technology. For example, the Georgian Polytechnical Institute is working in cooperation with the center, which makes available to us 50 percent of machine time. We have now have two computers operating and it is planned to install approximately 100 displays in the near future. But all this is clearly insufficient. The funds and volume of computer hardware delivered to the vuzes must be increased sharply and assistance must be provided in maintenance of it.

[Vashakidze] One should be seriously concerned about the methodical development of both school and vuz programs in computer technology. For example, the instructor must labor for not less than 100-150 hours, in compiling programs, so that the student can work at the display for 1 hour. The more display work stations at the vuz, the more time is expended on methodical develoment of programs. The modification of courses, modernization of which requires a colossal amount of additional time, must also be taken into account.

There is no doubt that the computer will help the teacher to intensify creative beginnings, true, only if the pedagog is able to communicate freely with the computer and if he knows how to work with it. We are presently very

far from solving this problem. And it must be solved quickly. And not only this, but a complex of problems related to computerization of the academic process.

[From the editors] Computer technology is penetrating our lives, including the academic process, ever more persistently with each year. Broad introduction of it will inevitably bring to light a number of problems, related to technical perfection of computer technology and with effective use of it. For this reason, it is desirable that the conversation begun by the editors also be supported and continued by specialists of different fields of knowledge.

6521

CSO: 1863/463

COMPUTERS AND SOVIET EDUCATION

Moscow PRAVDA in Russian 8, 9 Sep 85 p 3

[Article by M. Vasin: "Three-Wheeled Electronics"]

[Text] 1. The Logic of Consumers and Producers

One cannot say that this is a very responsible and intellectual exercise, but when I had just begun it, I discovered with some embarrassment that my fingers trembled a little. The exercise involves pressing a button on a small flat box, thus controlling the movements of a wolf, which catches eggs falling from trays on a screen about the size of a matchbox. This electronic game is called "Now wait a minute!," and is designed for children from 7 to 16 years old and the idea is to catch as many eggs as possible before the creaking laughter of a hare is heard, which means that you and the wolf have already had three misses and consequently the game is ended.

Aha, I thought, what would happen if I sat down behind real buttons rather than game buttons, pressing on which one takes on responsibility for scientific conclusions and design solutions, material and technical supportive enterprises and sectors and accident-free operation of very complicated and expensive equipment?

It would turn out poorly, for both me and those who depended on my buttons.

It seems to me that this discovery is a strong argument in favor of the fact that we still need these types of games.

It is permissible to ask here: and who can argue with this? There is generally no discussion at all. Parents, far removed from today's scientific and technical problems, are simply asked the quite natural question: do we need these new complicated games? After all, our grandfathers and greatgrandfathers got along without them and they sometimes sang and laughed. And they raised the Tolstoys, Newtons and Gagarins.

But there recently appeared in the press a very unequivocal statement of a famous scientist, a proponent of computer technology, that electronic games are not needed by children: "there is a very high risk of producing yet another dull exercise in the form of a game of cards or of watching hockey matches on television." True, one has in mind here the personal computer, which essentially

offers richer game possibilities, rather than the game "Now wait a minute!," but this does not change the essence of the matter. So it's small wonder that there would be doubts of whether they are necessary. Nevertheless, everyone recognizes today that a children's game is not an amusement and not an idle pastime, but a very important thoughtful activity for all those who have come (let us use Gorkiy's words) to know and change the world. And we have not been surprised for a long time when the physician explains the neuropsychic disorders of a child by a lack of games in his exercises and primarily prescribes game therapy rather than medicines or therapeutic procedures. In short, the most serious matter is that children's games require a serious attitude toward them on the part of adults.

And I play "Now wait a minute!" with all seriousness. I gradually become accustomed to the new technology. On three or four occasions I even hear "fanfares": the device applauds our and the wolf's achievements (200 eggs in the basket!) and as encouragement erased the penalty marks from the screen, opening the way to the next, 500-egg mark. To be honest, I wanted to ascertain whether I could reach it. But you can't sit behind the buttons for a long time: you quickly become bored and tired.

Therefore, there are few chances that this game will be turned into a "dull exercise." I obseved young fellows and became convinced that a 5-year old has patience for about 10 minutes and a 12-year old, having played the game for a half hour or so, forgot about it for a long time.

But what about other modern games?

"Secrets of the ocean" belong to the same type as "Wait a minute!" (one has to work one's way to a sunken ship without falling into the "arms" of a gigantic octupus). One can also include here the unique simulator "Elektronika EI-01," which displays changing audio and color combinations while the player has to remember and reproduce them with a keyboard. This exercise is within the capability of a preschooler. Yet another simulator is the hand calculator: it checks whether an arithmetic problem has been solved correctly.

A typical representative of electronics of the higher game level is the programmable self-propelled "lunar rover." It is capable of attracting children of different ages: one receives the mission, remembers it and then independently executes a series of maneuvers. One should also recall the speech synthesizer: it knows only 200 words and helps the child to study language.

All this can hardly plunge one into an irresistable passion. Video games are a different matter. Connected to a television set, it permits one to simulate soccer, tennis, lapta, shooting sports and so on. The device does not yet reproduce situations widely employed in automatic games: driving an automobile along a complicated track, participating in a motocross, jumps over barriers and air combat. But even without that, the video game can imprison children and adolescents--they do not want to switch off the "Christmas lights." Adults recognize that they must become accustomed and adapted to these types of equipment.

When one talks about people who are directly related to production, use and sales of electronic games, no one will express any doubts at all aloud and it seems that the words "are they necessary?" are left unsaid. These doubts understandably have a different basis.

The number of models produced at present are small. Even if one counts electronic games and the not very "intelligent" technology, the list only numbers several tens. This is on a background that almost 1,000 enterprises of more than 60 sectors and departments are involved in the games front and they produce 17,000 products! It is sinful with this power not to expand vigorously the variety of electronic games and to improve them.

The chief of the Administration for Development of the Industry of Game Production, Minlegprom SSSR [USSR Ministry of Light Industry], V. Volodin explains that the process is generally proceeding, but it is going slowly and at a creaking pace. And there are four reasons for this.

First. The enterprises of some ministries are not prepared to be involved with the latest games. And among them are also enterprises of Minlegprom.

The director of TsKTB [Central Design and Production Office] for Games S. Bormachev expressed it intelligibly:

"We--both VNIIigrushki [All-Union Scientific Research Institute for Games] and our design office and industry--are simply physically unable to be involved seriously with electronics: we essentially do not have the experimental base, necessary equipment, spaces and sales store, although there are very competent decisions for some of these problems. We of course are doing something and are 'animating' ordinary games by using electronic units so that they blink, make noises and write. But if the organizational base of our business is not changed, we will soon be unable to pull ourselves out of the situation."

But why, I asked, do you really need to change the base? The scientific research institutes, design offices, enterprises and department store are a ready-made scientific production association which is capable of handling microelectronics.

It turns out that this question has already been raised. But it has fallen on deaf ears.

The second cause is known to everyone: there is a shortage of materials and make-up articles--primarily of electronic units.

The same can also be said of Minelektronprom [Ministry of the Electronics Industry], only they require suitable plastics and methods of finishing them. But Minlegprom has all this at its disposal.

I would like to interject: what excellent game equipment can be produced through the joint efforts of several sectors on a cooperative basis! But.

The third cause is advanced as an obstacle here. Many enterprises, capable of producing electronic games, do not want to become involved in this. Because

commerce does not take on these products: the goods are complicated, expensive and unmarketable.

But despite these judgements, enterprises, let us say of Minelektronprom, want to produce "children's electronic games," they do produce them and they have an extensive program for this work in the future. But in order not to depend so much on unskilled commerce, the ministry does not dream of having 16 department stores and of seeking additional channels to market its products: electronic products for children are now sold in the Leningrad kiosks of "soyuzpechat" and through Rosposyltorg [not further identified]. And it turns out that purchasers stand in line for months for some types of "children's electronic games," even though they are expensive and the problem of making them less expensive is acute.

Finally, the fourth reason about which everyone talks: teachers and psychologists do not give clear recommendations and reference points to developers of games. And the special advice at the republic ministries of education, discussing a new toy or game, act only as an obstacle: whether to admit a mischievous bear that sticks out it tongue into children's lives or a binary number system or not to admit them. And nothing more.

I would like to state that I have long sought a specialist, capable of stating knowledgeably whether electronic games now being produced are necessary or useful to children and what requirements they must satisfy in the future. I have been unable to find this person either at the institutes of the USSR Academy of Pedagogical Sciences or among the psychologists of other scientific institutions and vuzes or within Minpros SSSR [USSR Ministry of Education]. Do we really have no one involved in such an enormous problem as the pedagogy and psychology of the latest games?

R. Kurbatova, the chief of the Administration on Preschool Education, USSR Minpros, calmed me down: she said that these pedagogical and psychological aspects were worked out at one time at VNIIigrushki, but this topic was eliminated after transfer of the institute to Minlegprom, the collective having been reoriented toward engineering problems.

In other words, let Minlegprom itself analyze the pedagogy and psychology of electronic games, while the pedagogs are incapable of this.

True, we have been inundated with information computer technology like a thunderstorm in a hot dry steppe. Although we heard the thunder for a long time, we still did not believe that this was serious. And now it has suddenly gushed out and burst upon us. And we are both curious and afraid and we have caught the spirit of it. And there is nowhere to hide.

Up until now, "intelligent" technology manifested itself somewhere on the horizon of our daily lives: an abstract science in multinumbered counting and in complex sectors of industry. And we have now unexpectedly been flooded with electronic games and we have suddenly spread our blue wings above our personal interests. This would be fine if only it touched only ourselves! But it is also reaching children and threatens to attract them into the unseen and untried.

Do we really need these unexpected diversions?

But there is nowhere to hide from them. This is the logic of scientific and technical progress.

2. The Logic of Scientific and Technical Progress

Confusion about intrusion of electronic games in our lives is perhaps not observed only among those specialists of science and industry whose professional interests are related to computer technology. They know that these games have been produced for a long time in many countries and in large numbers. And they themselves, it has happened, being unable to contain themselves against the temptation, have quietly, unbeknownst to management--sins must be hidden!--have entered a program into the computer for a tic-tac-toe game or have forced the computer to draw portraits and compose verses and music.

There is nothing strange in the fact that age does not extinguish the desire for games. It is obviously a strong instinct: in playing, one prepares oneself for new activity and develops those qualities of the body, spirit and intellect which remain unknown to real life.

Games were the source of many important affairs. Recall the poteshny regiments of the young Peter. Recall the dashing attacks of the young Suvorov on nettle thickets. And although computer technology is obligated by its appearance to science, I do not doubt that the "information society," "the electronic cottage" or something similar, based on broad computerization of peoples' lives, will grow from a game if one is prepared for this and will be a continuation of it.

But if one is talking seriously, then circumstances happen as follows. Besides the Newtons and Tolstoys, who knew nothing about electronic technology and who lost nothing because of this, modern mankind requires millions of highly skilled specialists in development and production and operation of computer technology. Moreover, it will be necessary in the future that billions of people of different occupations (not selected and not "with capabilities" but altogether) will freely and efficiently cope with these types of technology at work, at home and at leisure. Recognizing this need, the developers of the computers of the future--the fifth-generation computers--feel that the task of turning electronics "to face man" and of eliminating the barrier between it and the user is of primary importance.

A discernible shift in this direction has already been made in the latest innovation of scientific and technical progress--personal computers. Due to the fact that they are oriented toward the "simple," far from the heights of human electronic science, the areas of application of personal computers are expanding rapidly.

But regardless of how much computer technology is turned toward man, regardless of how far interests and requests have come to meet it, people must also be turned toward the computer and must proceed to meet it in their knowledge and skills. Because one cannot wait, scientific and technical and economic might are beginning to be dependent on it in one or another counter due to the scales of use of information computer equipment.

The Vice President of the USSR Academy of Sciences Academician Ye. Velikhov presents some facts and figures for one to think about. The rates of penetration of computer technology in production are such that, according to forecasts of Western specialists, up to 65-70 percent of existing workstations will be eliminated by the end of this century--only 15 years away. Some large enterprises plan to replace 90 percent of their workers with automatic electronic devices by 1995. A large part of the remaining personnel will consist of programmer-engineers.

The main obstacle in the path of the latest technology, continues Ye. Velikhov, is a psychological barrier. Everyone should fairly admit that the computer era has already begun and has placed its requirements on each of us. This means that everyone must learn. And the main concerns and hopes rest on the children. They must be trained for life in the "information society" of the 21st century. Electronic games in kindergarten and mastery of primary skills of working with computers in the secondary school all must be carefully thought out and vigorously implemented.

However, pedagogs and psychologists, as we have seen, are not in much of a hurry to think about the problems related to the appearance of electronic games. Perhaps, while the jury is out, a call should be made to the developers of games themselves in alliance with market analysts: analyze carefully why some products are purchased and others are not. Find out whether some indications can be detected as to the direction to take in developing the latest amusement products.

For example, a television accessory that offers a wide range of fascinating games has long lagged behind the demand for the simplest devices of the "Now wait a minute!" type. Is this only the reason that it has exceeded the cost ceiling acceptable to the purchaser? Or is the obstacle that it interferes with the nonplaying members of the family in watching television? In these cases the pioneer homes, public game rooms and pioneer camps can acquire the game attachment (automatic video games, the cost of which is 30 times higher than the cost of the television attachment, can be purchased or leased for pioneer camps and even kindergartens). And perhaps the point is the absence of persuasive advertisement?

But the author is inclined toward a different version. I first recall that not so long ago research showed that, upon acquiring packaged goods, purchasers, especially women, prefer those packages (attractive cans and boxes) that can be used in the home.

The television attachment was made so that its game function was not "packed" in anything useful: the equipment is designed only for games. The possibility of playing is "packed" in something of independent value and devices of the "Now wait a minute!" type: this small box is also an electronic wristwatch. Such usefulness is important not only for purchasers--mothers and dads, but for the child as well: he imperceptibly acquires skill in telling time and learns about watches.

As one would imagine, one of the requirements on "children's electronics" is also denoted here: an alarm clock or stopwatch, calendar or hand calculator--it matters little what--must be combined with a game.

It may also and should broadly reveal its computer capabilities in the future. Even the little box "Now wait a minute!"--even though it is tiny, simple and has very limited capabilities, it is still a computer. Incidentally, it is not as simple as it seems. The chief engineer of the Main Scientific Research Administration of Minelektronprom A. Andreyev, explaining to me the high technical level of the device ("this is not a toy but a concentration of modern scientific advances"), recalled that the main innovation of game electronics, its "brain" is the microprocessor, in which approximately 100,000 operating elements are concentrated on a silicon wafer the size of an infant's fingernail.

"If we had made a similar device 15 or 20 years ago, it would occupy," A. Andreyev looked around his small office, "occupy almost the entire room."

It is not surprising that scientists found many tens of thousands of useful applications for microprocessors. So that microprocessor technology is capable not only of playing with children, assigning them rigid rules and limited subjects, but also of bowing to their desire to show initiative, to introduce something of their own in the established course of events. For example, setting his alarm to the required time, a child subordinates the device to his own will and to his own intellect and takes a tiny, but important step toward programming. Why not also offer him the possibility of introducing into the toy a schedule of his most important affairs for the morning or after school so that electronics remind him with a bell and print out on a screen about change of classes, a break and a meal?

The main thing of course is not in these reminders, but in the "work" of the young person with electronic devices and in the desire and elementary skills in being involved with them. It is this and primarily this path--having become interested in a game, to be awakened to independent activity--that leads to natural, that is, to painless, enthusiastic and joyful study of computer literacy, in other words, to education of a generation which perceives information computer technology as something simple and ordinary.

Something has already already occurred in the present generation of preschoolers--in the part of "motorizing" their consciousness. Surrounded by their first months of life with toy automobiles, constantly seeing them later on the street, they gain an excellent understanding of models of automobiles, their working principle and look with joyful perplexity at their kindergarten teachers, who have ascertained that there are only three varieties of motor vehicles--passenger cars, trucks and taxis.

The next generation of kindergarten children will think it just as funny, the same as my fingers and those of my graying colleagues tremble when we first take "Now wait a minute!" into our hands or something similar. And it is very good if they are never to understand that we grownups are far from electronic technology when we are concerned with it every day, and feel somewhat uneasy and distrust even, as if we suspect a dirty trick on its part. No matter how we try to relate the epithet "intelligent" to the game, it is still difficult to get away from the feeling that it is not you that are playing with it, but it is playing with you: it is looking at you and determining your capabilities. And it displays on the board your standing. Children perceive all these

innovations of ours as having existed for centuries and easily perceive the rules of communicating with electronics.

And even so, although we elderly people have become accustomed to the latest electronic amusements, it is they that are our reliable conductor to electronic matters. Proof of this is the "career" of the personal computer: having grown from an electronic game, it retained the capabilities of a mother, due to which it provided for children, having no special training, the capability of learning to control them by playing and, by then playing to perform important work (as it turned out, specific doses of amusement facilitate and stimulate the work activity in even the most serious people).

One of the creators of the personal computer reveals its significance in the following example. A man traveling on a bicycle, efficiently using his muscular energy, is far superior to all known animals, whereas he is among the outsiders without his bicycle. The personal computer is a "bicycle for the mind," an individual tool for reinforcing the natural capabilites of the human intellect.

If we talk about large computers and large information systems, then by continuing this analogy, one must equate them to high-speed automobiles, super-powerful dump trucks and other super types of motorized technology. And of course the "transport system" for the information world should also have its own type of training wheels in teaching and preparation for real life. Game electronics has already entered the "position" of intellectual training wheels. One need only provide the capability of gradually transforming it to a two-wheeled bicycle as needed.

6521

CSO: 1863/463

WORK ON PERSONAL COMPUTERS FOR TRAINING PROGRAMS

Leningrad LENINGRADSKAYA PRAVDA in Russian 7 Sept 85 p 2

SAMOYLIS, S.

[Abstract] The article is an interview with Candidate of Technical Sciences Oleg Yemel'yanovich Vershinin, docent of the chair of microelectronics and radio technology of the Electrical Engineering Institute imeni Ul'yanov. Vershinin heads a scientific group which has developed a microprocessor training complex. The group reportedly is now working on development of a personal computer for schools, which it hopes to have ready by next year.

In the interview, Vershinin comments on the status of work on personal computers for use in education, industry and the home and on prospects for their widespread introduction, as well as the social and economic implications of this. He says hundreds of thousands of personal computers will be needed in the near future. He notes that classrooms equipped with computers have already appeared in Leningrad schools, and he calls their equipment adequate for training purposes. Vershinin points out, however, that these school computers do not meet all requirements for computers of the 'personal' type; they lack printers, for example. He observes that the number of actual personal computers now in use is relatively small, and they must be serviced by engineers. Consequently, most of these computers are found in industry.

Asked about his group's work on the microprocessor training complex, Vershinin said that a miniature computer model was developed which helps to train students in basic computer-operation skills. The complex is to be put into production in 1986, at the Precision Electronic Instrument Plant in Omsk. Another plant that will produce the complex is Leningrad's Electronic Instrument Plant, which proposed the development of the school computer on which Vershinin's group is now working. Scientists in Tomsk, Moscow and Zelenograd reportedly are also developing personal computers. Vershinin said the hope is that personal computers can be made both reliable and affordable--in the same price range as color television sets, for example.

FTD/SNAP
CSO: 1863/6

PUBLICATIONS

SYNOPSES FROM COMPUTER TECHNOLOGY OF THE SOCIALIST COUNTRIES, VOL 16, 1985

Moscow VYCHISLITEL'NAYA TEKHNIKA SOTSIALISTICHESKIKH STRAN in Russian
Vol 16, 1985

[Synopses of articles from the biyearly volume "Computer Technology of the Socialist Countries, Finansy i statistika.]

THE PROSPECTS OF DEVELOPMENT OF COOPERATION OF THE SOCIALIST COUNTRIES IN THE FIELD OF COMPUTER TECHNOLOGY

[Synopsis of article by M. Ye. Rakovskiy, pp 3-8]

[Text] Development of needs of the socialist countries for computers are considered. Information on state of the art of the socialist countries cooperation in this field and rates of development of computer production is given. Role of computers of various classes in the hierarchy of control systems in the national economy is shown.

PARTICIPATION OF THE PEOPLES REPUBLIC OF BULGARIA IN THE INCREASING EFFECTIVENESS OF THE INTERNATIONAL COOPERATION IN USE OF ELECTRONIC COMPUTERS

[Synopsis of article by L. Lazarov, pp 9-11]

[Text] The tasks formulated by the party organizations of the PRB on development of electronic computers in this country are considered. Particular attention is paid to the effective use of computers in the national economy, as well as to the cooperation of Bulgarian specialists in the Council for Application of Electronic Computer Technology in the field of development of model application programs for automatic control systems and programming technology.

USE OF COMPUTER TECHNOLOGY IN HUNGARY AND TASKS FOR THE FUTURE

[Synopsis of article by L. Varga, pp 12-13]

[Text] Special features of computer technology implementation in Hungary and methods of solution of the existing problems related to lag in remote data processing and training of personnel are described. Several well known

systems using computers successfully including computer aided production systems in nonindustrial field as well as in services are considered.

DEVELOPMENT AND IMPLEMENTATION OF MICROCOMPUTERS IN HUNGARY

[Synopsis of article by T. Boromisza and K. Stuka, pp 14-16]

[Text] State of the art in computer technology development is defined by widespread use of microprocessors in computer design. Work in the field of microprocessors done by various scientific institutes and enterprises in this country is considered. Main tasks in this direction --standardization of microprocessors, development of dedicated technological systems for microcomputer design are formulated by coordinating organizations. Special purpose program "Research and development of microcomputers and microcomputer systems and their uses" is described.

CURRENT PROBLEMS OF THE GDR PARTICIPATION IN THE INTERGOVERNMENTAL COMMISSION IN THE FIELD OF COMPUTER TECHNOLOGY ACTIVITIES

[Synopsis of article by G. Merkel, pp 17-19]

[Text] The GDR contribution to the development and production of the ES and SM computers within the frame of the MPKVT [International Governmental Commission on Computer Technology] is considered. The GDR achievements in microelectronics development are defined. The basic directions in the design of computer architecture, integrated circuits, and raising of computer reliability are analyzed.

THE 15 YEARS OF COOPERATION OF THE POLISH PEOPLES REPUBLIC IN THE GOVERNMENTAL COMMISSION IN THE FIELD OF COMPUTER TECHNOLOGY

[Synopsis of article by K. Badzmirowsky, pp 20-22]

[Text] The process of development of computer industry in the PPR, participation of main enterprises and the role of international, cooperation for the development of computer technology in Poland are considered. Indexes of computer products export, information on some exported systems, outlook for further strengthening of industrial basis for computer production and export are given.

THE RESULTS OF COOPERATION OF THE SOCIALIST COUNTRIES IN THE FIELD OF ES COMPUTERS IN THE CZECHOSLOVAK SOCIALIST REPUBLIC

[Synopsis of article by J. Vrany, pp 23-25]

[Text] Quantitative evaluation of productions development for computer devices in which the CzSSR is specialized within the frame of cooperation in production of computers are given. Evaluated are standard Czechoslovakian computer industry, export and import trends, role of software as well as standard of work in this direction in the CzSSR.

POSSIBILITIES OF HIGH DENSITY RECORDS. PROBLEMS AND PROSPECTS OF DEVELOPING A NEW GENERATION OF STORAGE DEVICES

[Synopsis of article by U. N. Shamatov and V. G. Makurochkin, pp 26-37]

[Text] Basic parameters and limits of high density magnetic records are given. Analysis of characteristics of logitudinal and vertical magnetic records is given. Formulated are problems of development of a new generation of external storage. Their possibilities in the immediate and future prospects.

STATE OF THE ART AND PROSPECTS OF SYSTEMS AND DEVICES DEVELOPMENT FOR DATA PREPARATION PRODUEED IN THE PEOPLES REPUBLIC OF BULGARIA

[Synopsis of article by T. A. Topalov and A. D. Mikhaylov, pp 38-42]

[Text] Basic requirements to the technical and economical parameters of data preparation systems using magnetic media are formulated. Technical information on data preparation magnetic tape units ES-9002 and ES-9004, data preparation units ES-9114 and ES-9112, multistation systems ES-9003 and ES-9005 are described. Specific features of the latter system are described in detail.

SYSTEM ENGINEERING ACTIVITIES TO PROVIDE COMPATIBILITY OF THE ES DEVICES PRODUCED IN THE GERMAN DEMOCRATIC REPUBLIC

[Synopsis of article by Y. Kholeshovskiy and G. Seidel, pp 43-49]

[Text] One of the important problems in development of specialization and cooperation of computer production is checking of compatibility of units operating in one computer system and produced in various countries. The GDR experience in organization of such activities and implementation of procedures, which guarantee the compatibility of computer devices within the ES-1055 computer system produced in the GDR as well as procedrues of insertion of the new devices into computer configuration is described.

CONCEPTION OF DEVELOPMENT OF GRAPHIC TERMINAL STATIONS FOR SM COMPUTERS

[Synopsis of article by V. G. Zakharov and V. I. Fuks, pp 50-55]

[Text] Fields of implementation of graphic terminals are considered. The effectiveness of module design of graphic terminal stations and functional purpose of some modules are shown. Quality and quantity features of modules used in development of multipurpose graphic terminal stations are formulated.

INTEGRATED SYSTEMS OF GENERAL PURPOSE, MINI AND MICRO COMPUTERS FOR PROBLEM ORIENTED SYSTEMS

[Synopsis of article by N. Zhelezov and I. Yulari, pp 56-64]

[Text] The possibility of development of integrated systems based on ES, SM, and micro computers with network architecture is considered. Levels of systems, types of devices, and computers for each level, system software used for development of suggested systems are shown. Specific structures of several suggested systems of various complexity are given.

A STUDY OF COOPERATION IN DEVELOPMENT OF THE ES COMPUTER SYSTEM SOFTWARE

[Synopsis of article by V. Myunkh and L. D. Raykov, pp 65-71]

[Text] A study in organization of the ES operating systems development by several countries is considered. Specific features of the jointly developed basic operating systems and main directions of future development are given. Operating systems DOS-3, OS 6.1, SVM ES, OS-7 are described.

ACCESS METHOD FOR SYSTEM AND NETWORK ARCHITECTURE REMOTE DATA PROCESSING BASED ON ES COMPUTERS

[Synopsis of article by H. J. Baumhakel and K. Engel, pp 72-78]

[Text] A new component of operating system OS-7 ES, representing an access method, used for network architecture remote data processing is described. The access method OSTMD is intended for remote data processing systems based on teleprocessors. The access method OSTMD interacts with teleprocessing network control program. Functions of this program are described. Advantages of the OSTMD access method are formulated. General structure of the network teleprocessing is described.

THE STRUCTURE OF THE NETWORK TERMINAL SYSTEMS BASED ON THE SM-4 COMPUTER

[Synopsis of article by V. V. Pirogov, N. V. Leytan, and G. I. Geydeman, pp 79-85]

[Text] Development system based on the SM-4 computer containing program systems operating in the OS RV environment is described. Program systems permit to generate support systems for: network microprocessor adapters during laboratory-, bench-, and service tests; interaction of application processes using network access method, network terminal systems; support of network microprocessor systems program compatible with SM computers.

THE EFFECTIVENESS OF COMPUTER APPLICATION IN THE NATIONAL ECONOMY

[Synopsis of article by V. I. Maksimenko, pp 86-94]

[Text] Basic directions of computer application in the national economy are considered. Information on the most effective computer systems in various industrial and nonindustrial branches is given. The basic means of increasing the computer application effectiveness are outlined.

THE PROBLEM ORIENTED SYSTEM "TELERADIOTEKA"

[Synopsis of article by T. A. Aus, V. A. Vanem, and M. Kh. Sarv, pp 95-99]

[Text] The automatic information system (AIS) for radioelectronic institutions working in the field of teleprocessing is described. The tasks of such a system related to wordprocessing, inquiry output, data equisition and data updating are formulated. The conceptions of AIS design, selection of hardware and basic operating system as well as some special features of the system, related to the real time operating are considered.

GENERAL PURPOSE SYSTEM FOR ECONOMICAL DATA PROCESSING BASED ON THE SM 1800 MICRO COMPUTER

[Synopsis of article by D. V. Yurin and L. G. Basov, pp 100-107]

[Text] Hardware and software structure of general purpose system for economical data processing based on the SM 1800 micro computer is considered. Functional possibilities of the system in design of automated work stations for solution of application tasks in planning, book-keeping, accounting, word processing and others are described. Means of unification of system design process for concrete applications to reduce expenses are shown.

DEVELOPMENT OF THE ES COMPUTER APPLICATION IN COMPUTER CENTERS IN THE POLISH PEOPLES REPUBLIC

[Synopsis of article by T. Pawlak, pp 108-115]

[Text] The network of enterprises ZETO--an amalgamation suggesting information processing services all over the territory of Poland is described. Main network users and their tasks, as well as all services suggested to customers are offered. The development of producing capacity of amalgamation as well as specific features of the used application software are shown.

REAL TIME CONTROL SYSTEMS FOR ASSEMBLY PROCESSES

[Synopsis of article by E. I. Velesko, B. H. Mukosey, and A. P. Sorokin, pp 116-123]

[Text] Automatic organizational and technological control system for assembly process (ASUOT--Sborka), the upper level of which is based on the

ES-Computer, and the lower level is based on the SM-Computer is described. ASUOT--Sborka is intended for control of highly effective conveyor assembly process. Basic organizational and technological features of system hardware and software are given.

COMPUTER AIDED INTEGRATED CONTROL SYSTEM FOR AGRICULTURAL ENTERPRISE

[Synopsis of article by V. Hanyets, pp 124-126]

[Text] Survey of specific features of the agricultural enterprise is given. Conditions, methods of model control system for such an enterprise and its possibilities are described. Structure, specific parameters of hardware and software are given, application possibilities and operation experience of such a system are described.

PROGRAM OF COMPUTER AIDED MANUFACTURING SYSTEM DEVELOPMENT AT THE "IKARUSZ" BUS PLANT

[Synopsis of article by I. Gerencher and J. Simon, pp 127-132]

[Text] General description of development of the CAM system for one of the biggest enterprises in Hungary is given. Data on the basis subsystems, procedures of their implementation, and methods of subsystems integration, hardware development, main results of the CAM application are given.

CONTROL SYSTEMS FOR FLEXIBLE COMPUTERIZED MANUFACTURING (FCM) SYSTEMS FOR MACHINING INDUSTRIES BASED ON THE SM-4 COMPUTER

[Synopsis of article by V. I. Aksenov, V. E. Alyakrinskiy, and Yu. I. Voskoboynik, pp 133-138]

[Text] Methodology of design and development of FCM systems for machining industries is given. Main preconditions for FCM functioning are defined. The requirements for basic hardware configuration of control system, considered as computer aided discrete control system are formulated. Decomposition of functions and tasks of the specific software is provided. The role of each task in general system is shown. The results of system application are given.

TRENDS IN DEVELOPMENT OF THE CENTRALIZED COMPUTER SERVICE SYSTEM

[Synopsis of article by L. N. Il'in and N. M. Sharunenko, pp 139-145]

[Text] Requirements of computers from the point of view of centralized maintenance and operation of computers are formulated. The aims and methods of the centralized computer service system operation are described. Particular attention is paid to the possibility of teleservice system development.

UDC 681.3.06

THE ACTIVITIES OF THE HUNGARIAN FUND OF PROGRAMS AND PROGRAM MAINTENANCE

[Synopsis of article by N. Mikhaylov, pp 146-149]

[Text] The activities of the national fund of program products and their distribution and sale in Hungary are considered. The attention is paid to the new methods of providing Hungarian users with these software products.

UDC 681.3.00

THE ACTIVITIES OF THE NATIONAL SERVICE ORGANIZATION (NOTO) IN CZECHOSLOVAKIA

[Synopsis of article by V, Khoyka, pp 150-154]

[Text] Main directions of the NOTO in the SzSSR are described. Particular attention is paid to sale of computers and distribution of model software packages. The activities of the NOTO is providing users with spare parts, training of specialists, and cooperation with the NOTO of the other cooperating countries.

UDC 681.3.00

TRAINING OF THE GDR SPECIALISTS AT THE TRAINING CENTER OF THE NOTO "ROBOTRON-ANLAGENBAY LEIPZIG" USING THE SOVIET ES COMPUTERS

[Synopsis of article by A. Hoffmann and H. Steinhoff, pp 155-158]

[Text] The tasks of training specialist to operate computers imported from the USSR are considered. Expediency of implementation of the developed methods of module design of training course is shown. Process of instructor training is described. The results achieved in training of the GDR specialists to operate Soviet computers ES-1020, ES-1022, ES-1035 are evaluated.

UDC 681.32

THE NEW COMPUTERS DEVELOPED IN THE USSR

[Synopsis of article by A. P. Zamorin, Yu. P. Selivanov, and Ya. P. Lokshin, pp 159-165]

[Text] Short features of ES computers ES-1061, ES-1036, ES-1046, ES-1060, and ES-1065 are given. Basic features of the new system software oriented for use with these computers are considered.

UDC 681.327.11

THE PATTERN RECOGNITION PROCESSING SYSTEM A 6470

[Synopsis of article by V. Kempe, B. Rebel, and W. Shultse, pp 166-170]

[Text] Specific features and structure of the pattern recognition system based on microcomputer SM 1630 are given. Three specific configurations of the system intended for various modes of operation are described. Information on software of the system is presented.

UDC 681.327.11

THE GRAPHIC SYSTEM GKS 1600

[Synopsis of article by B. Kerer and Yu. Ruthenbeck, pp 171-176]

[Text] Computer graphic system based on the microcomputer SM-1600 taking into consideration international recommendations is described. Six modifications of working stations and software for them are considered.

/9835
CSO: 1863/396/E

- END -